United States Patent [19]

Bowles

[11] **3,749,965**

[45] **July 31, 1973**

[54] **SYSTEM FOR BLANKING SELECTED AREAS OF A RASTER**

[75] Inventor: **Lloyd W. Bowles**, Lakewood, Colo.

[73] Assignee: **Computer Image Corporation**, Denver, Colo.

[22] Filed: **Oct. 22, 1970**

[21] Appl. No.: **82,942**

[52] U.S. Cl. **315/22**
[51] **Int. Cl.** **H01j 29/46**
[58] **Field of Search** 315/18, 19, 20, 21, 315/22

[56] **References Cited**

UNITED STATES PATENTS

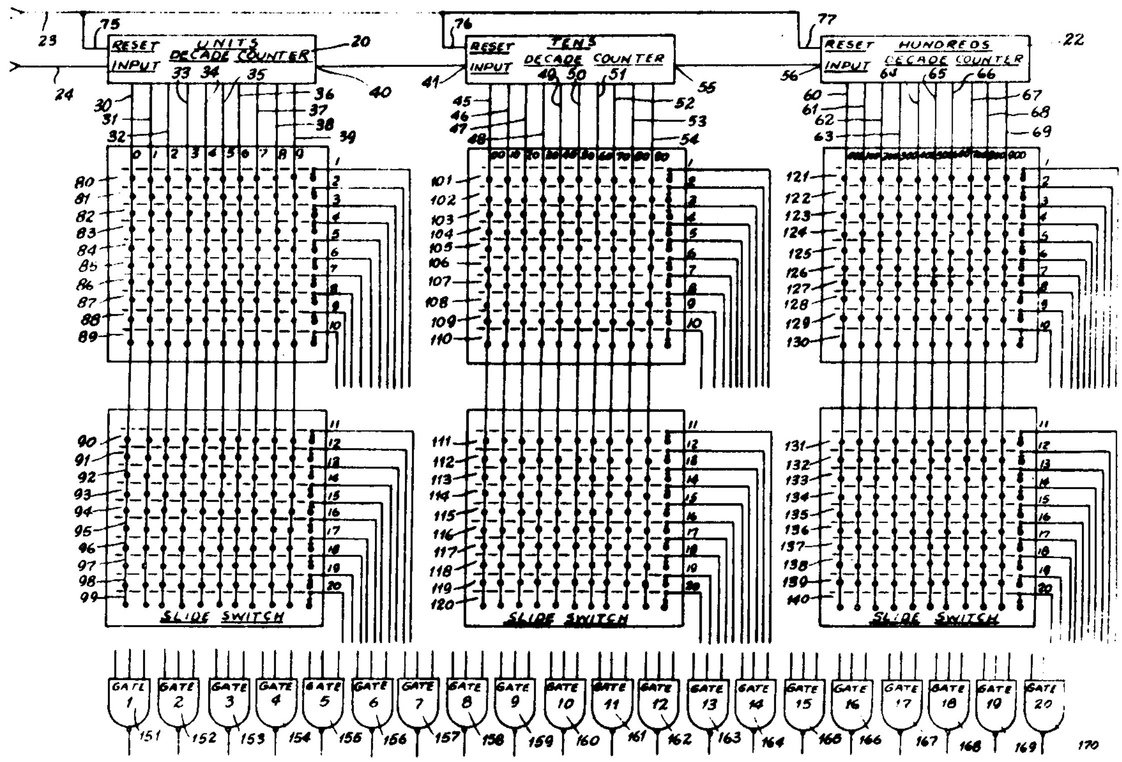
3,471,848	10/1969	Manber	315/22
3,432,845	3/1969	Douglas et al.	315/22

Primary Examiner—Carl D. Quarforth
Assistant Examiner—J. M. Potenza
Attorney—Rogers, Ezell, Eilers & Robbins

[57] **ABSTRACT**

This invention comprises a method and apparatus for electronically blanking selected parts of a raster. First, signals are generated, each representing a line of the raster. Selected ones of the first signals are gated to produce second signals corresponding to selected lines of the raster in accordance with the blanking patterns desired. Selected ones of the second signals are combined to produce third signals for de-intensifying the beam of the cathode ray tube on which the raster is displayed, thereby blanking certain areas of the raster in a single dimension. To blank areas of the raster in two dimensions delay signals are generated for modulating the beam intensity in response to other selected second signals, the widths of the delay signals being adjustable to produce blanked areas of almost any desired dimension.

18 Claims, 6 Drawing Figures



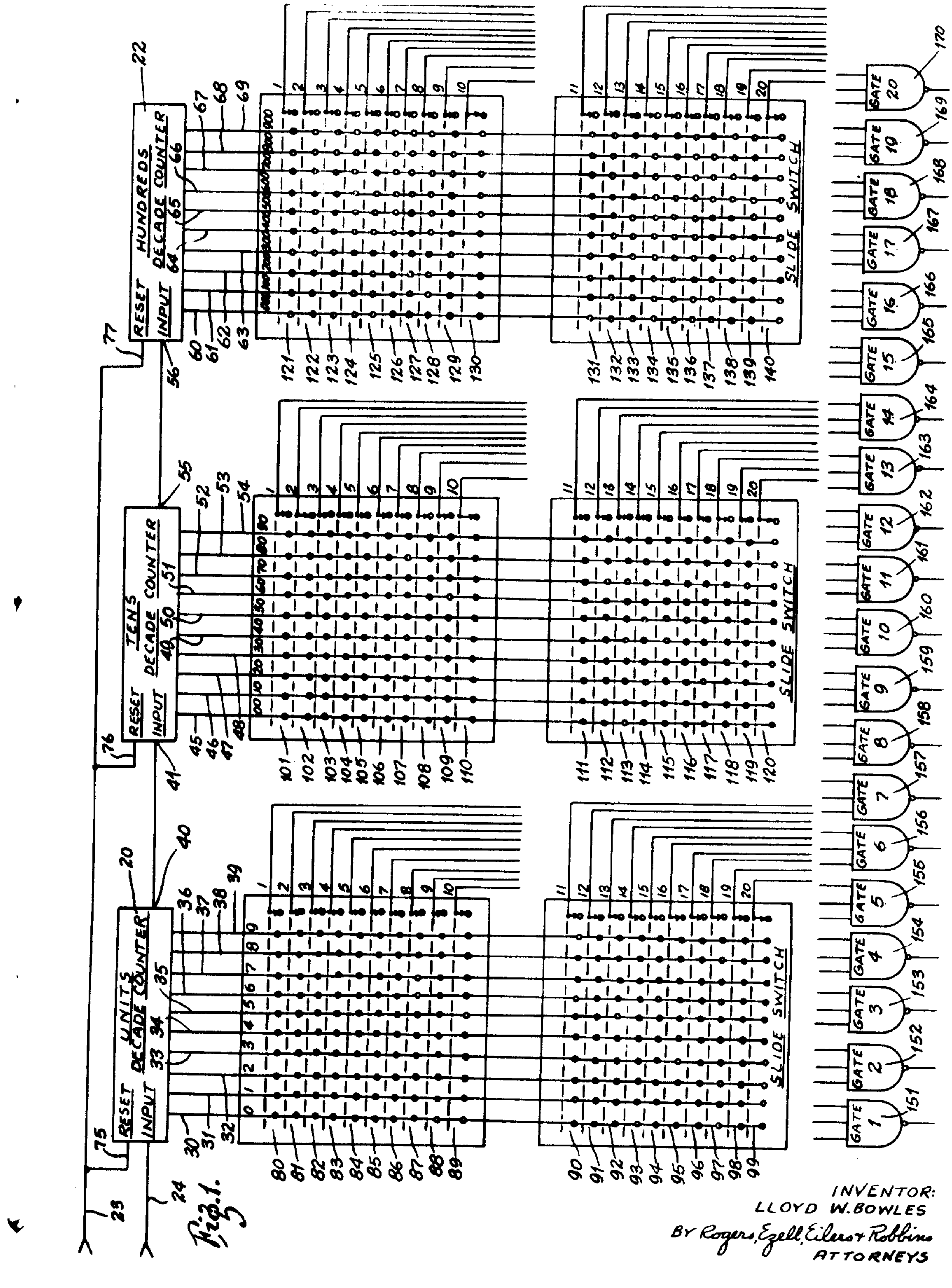


Fig. 1.

INVENTOR:
LLOYD W. BOWLES
BY Rogers, Ezell, Eilers & Robbins
ATTORNEYS

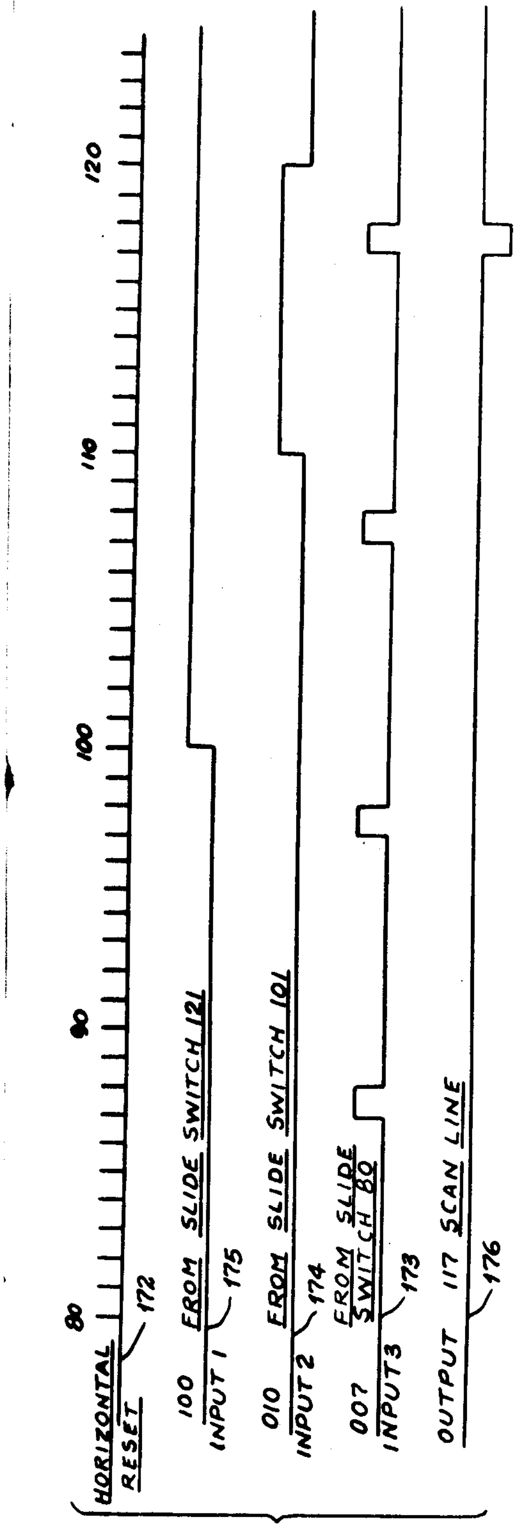


Fig. 2.

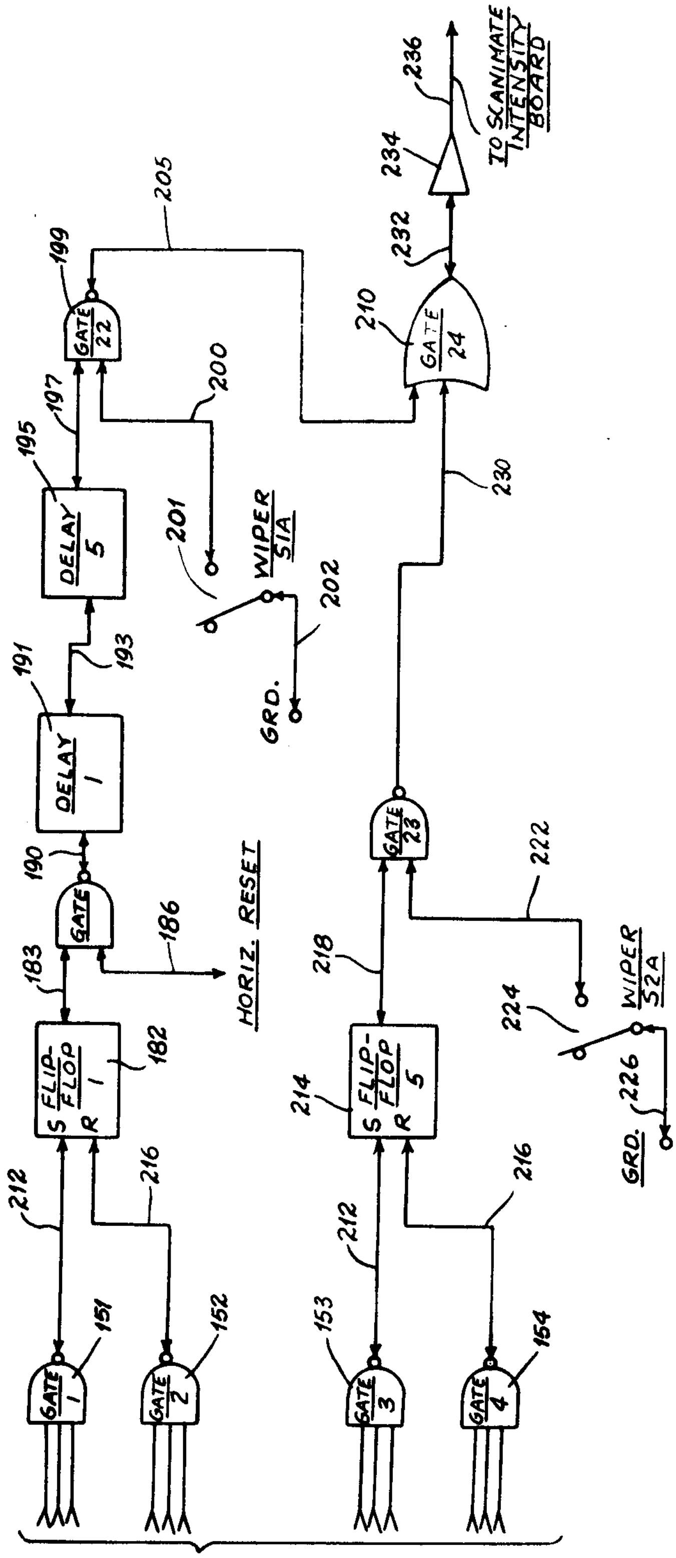


Fig. 3.

INVENTOR:
LLOYD W. BOWLES
BY Rogers, Ezell, Eilers & Robbins
ATTORNEYS

PATENTED JUL 31 1973 3,749,965

SHEET 3 OF 3

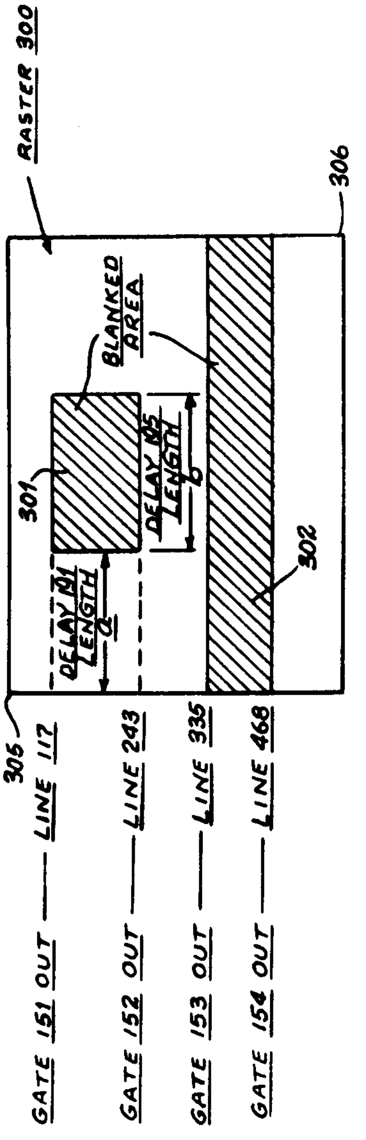


Fig. 4.

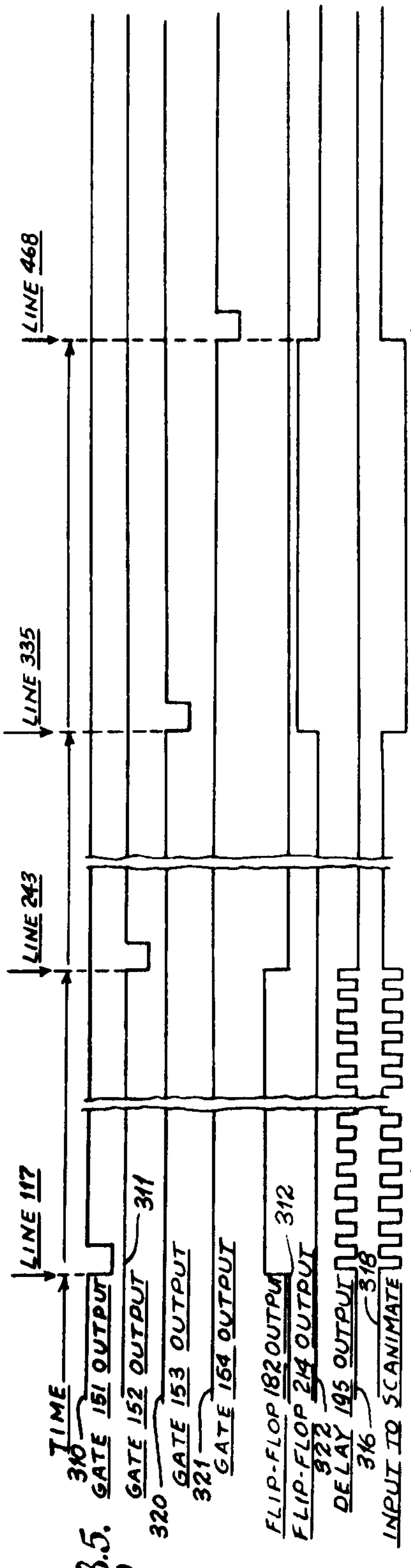


Fig. 5.

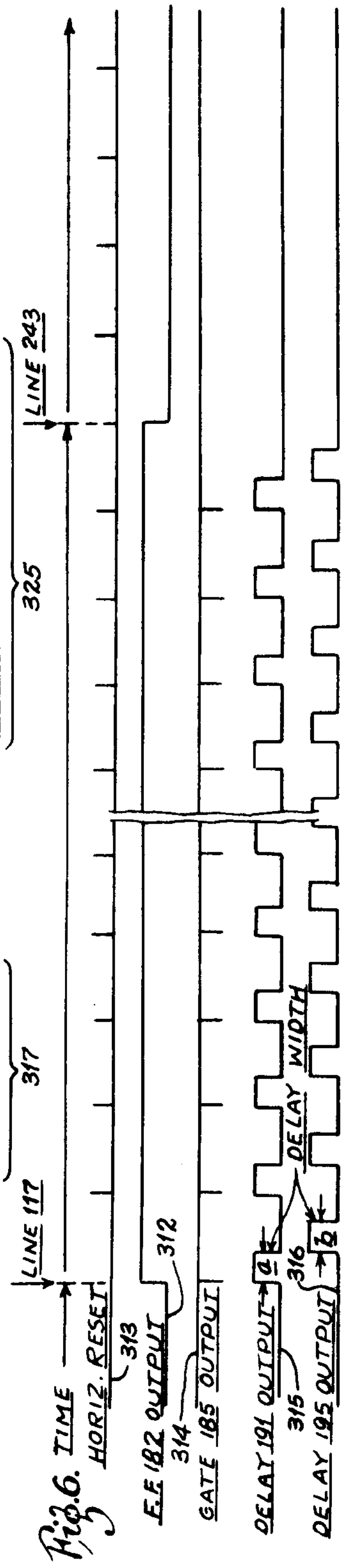


Fig. 6.

INVENTOR:
LLOYD W. BOWLES
BY Rogers, Ezell, Eilers & Robbins
ATTORNEYS

United States Patent Office

918,284
Registered Aug. 10, 1971

PRINCIPAL REGISTER
Service Mark

Ser. No. 331,163, filed June 27, 1969

SCANIMATE

Computer Image Corporation (Delaware corporation)
2162 S. Jason St.
Denver, Colo. 80223

For: PRODUCTION OF RECORDED ANIMATIONS BY PHOTOGRAPHING OR VIDEOTAPING THE OUTPUT GENERATED BY A COMPUTER THAT ANIMATES IMAGES DELIVERED TO ITS INPUT, in CLASS 107 (INT. CL. 41).

First use Feb. 7, 1969; in commerce Feb. 7, 1969.

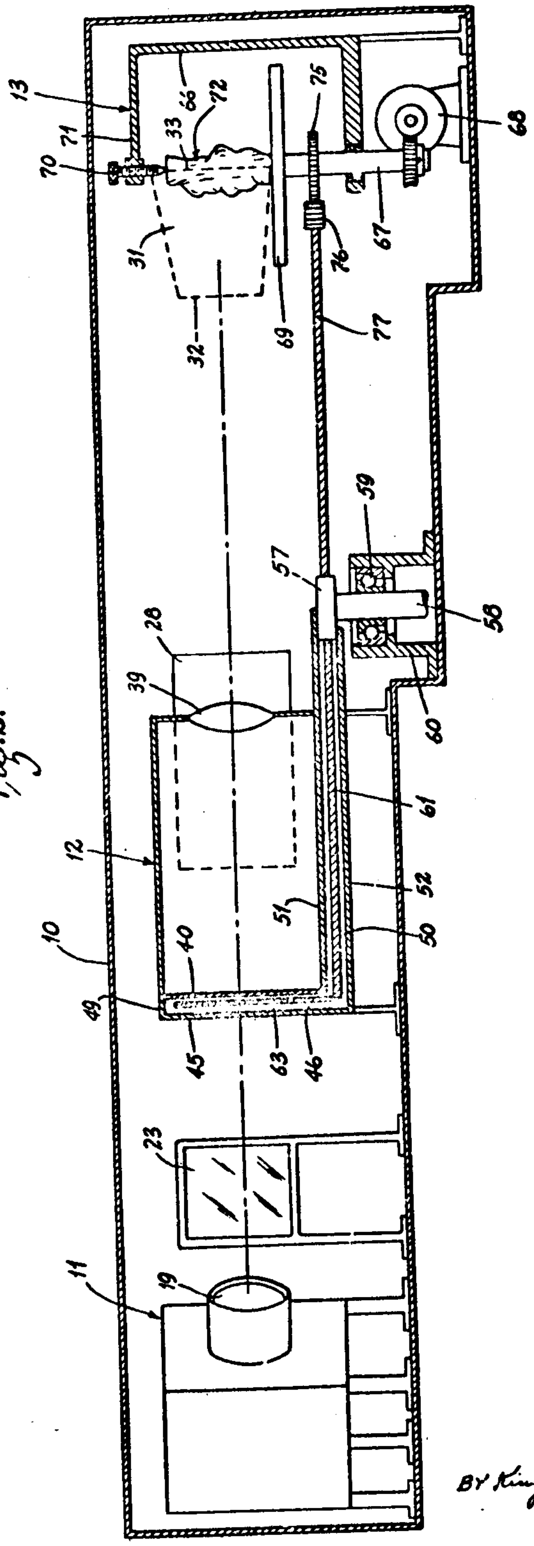


Fig. 2.

INVENTOR:
LEE HARRISON,
BY Kingsland, Rogers, Ezell & Robbins
ATTORNEYS

Edwin J. T[illegible]hman
2026 S. [illegible]
Denver, Colorado 80210

AUTOMATIC GENERATION AND DISPLAY OF ANIMATED FIGURES

Original Filed Nov. 29, 1962 12 Sheets-Sheet 1

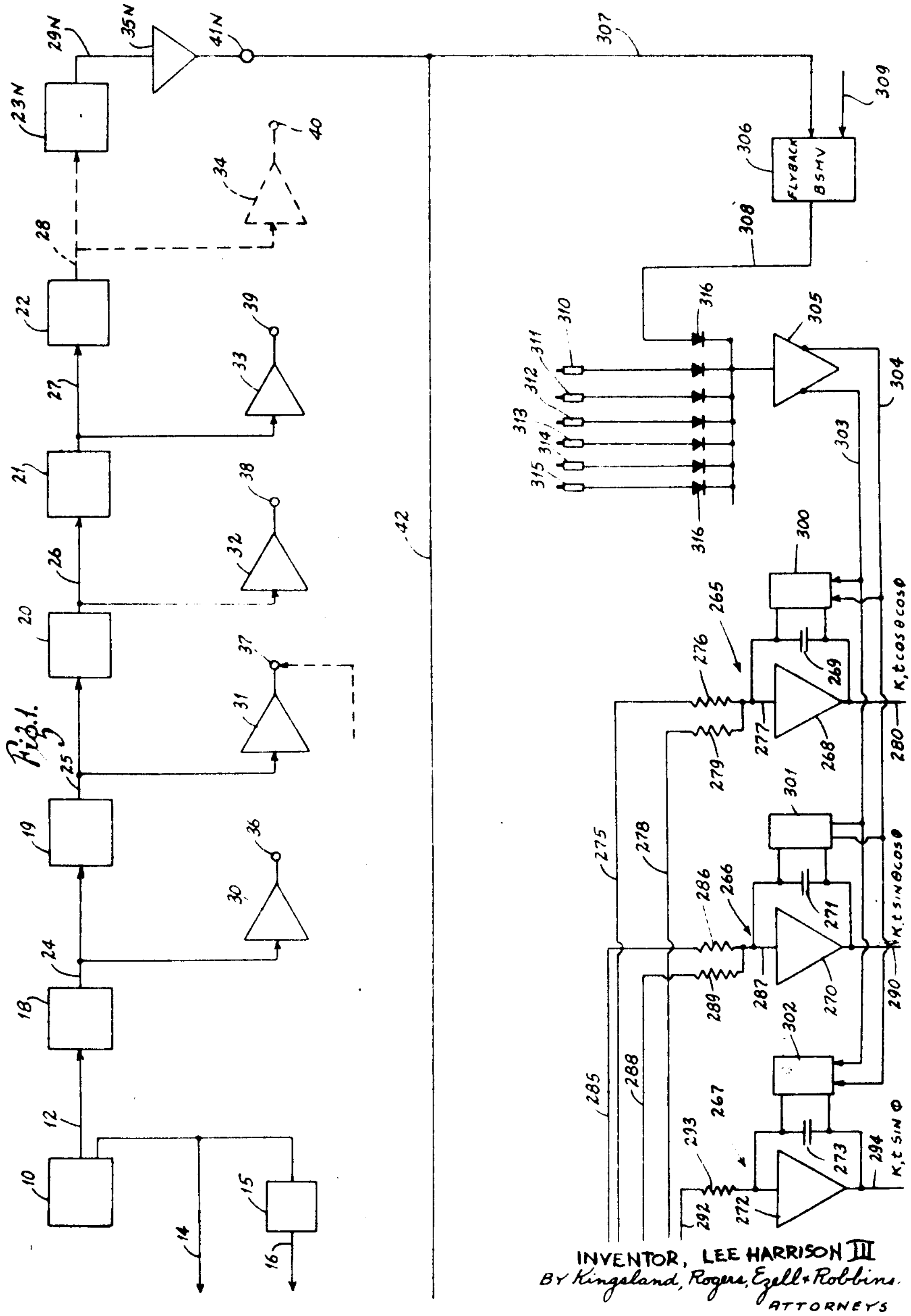


Fig. 1.

INVENTOR, LEE HARRISON III
BY Kingsland, Rogers, Ezell & Robbins
ATTORNEYS

AUTOMATIC GENERATION AND DISPLAY OF ANIMATED FIGURES

Original Filed Nov. 29, 1962 12 Sheets-Sheet

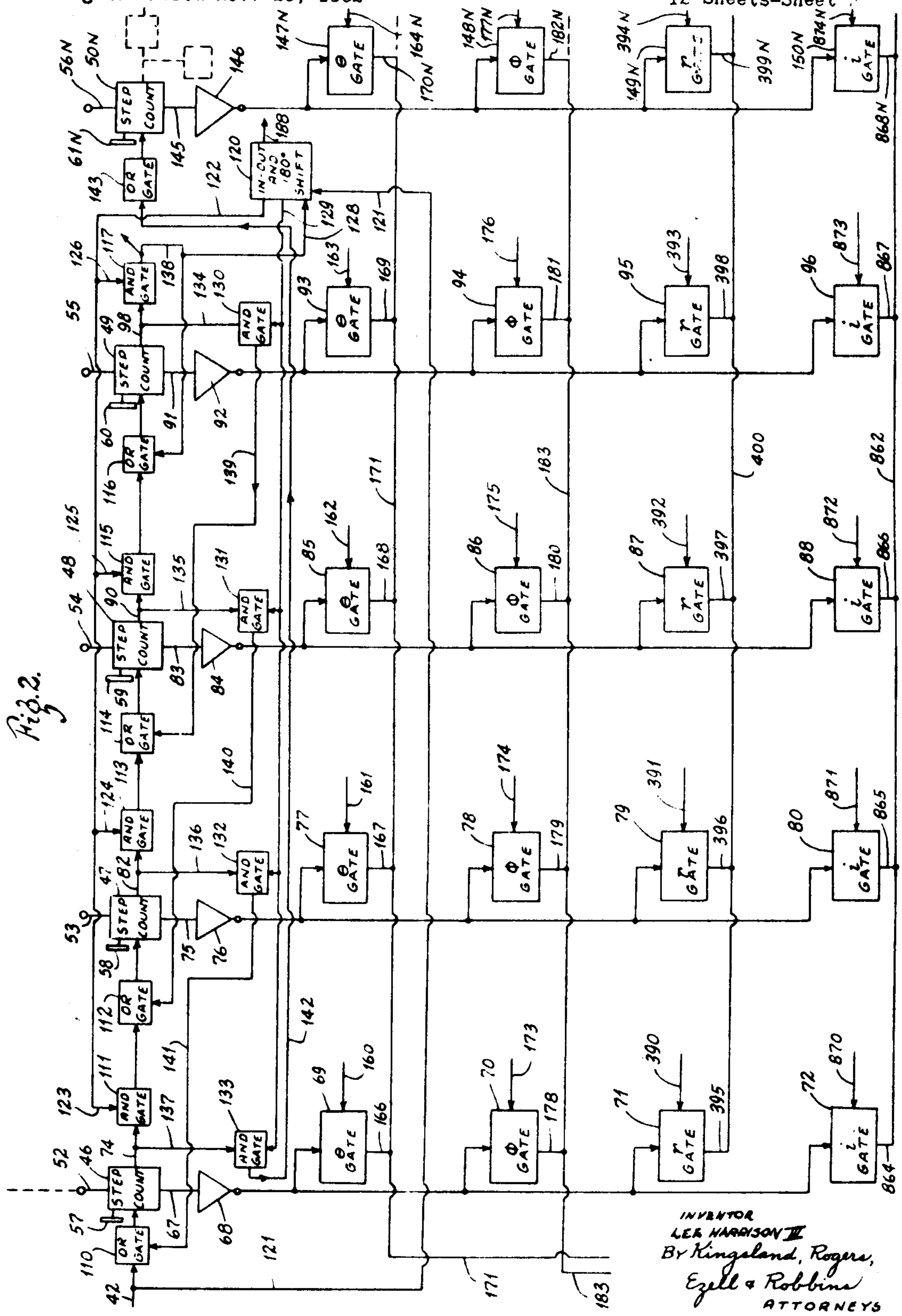
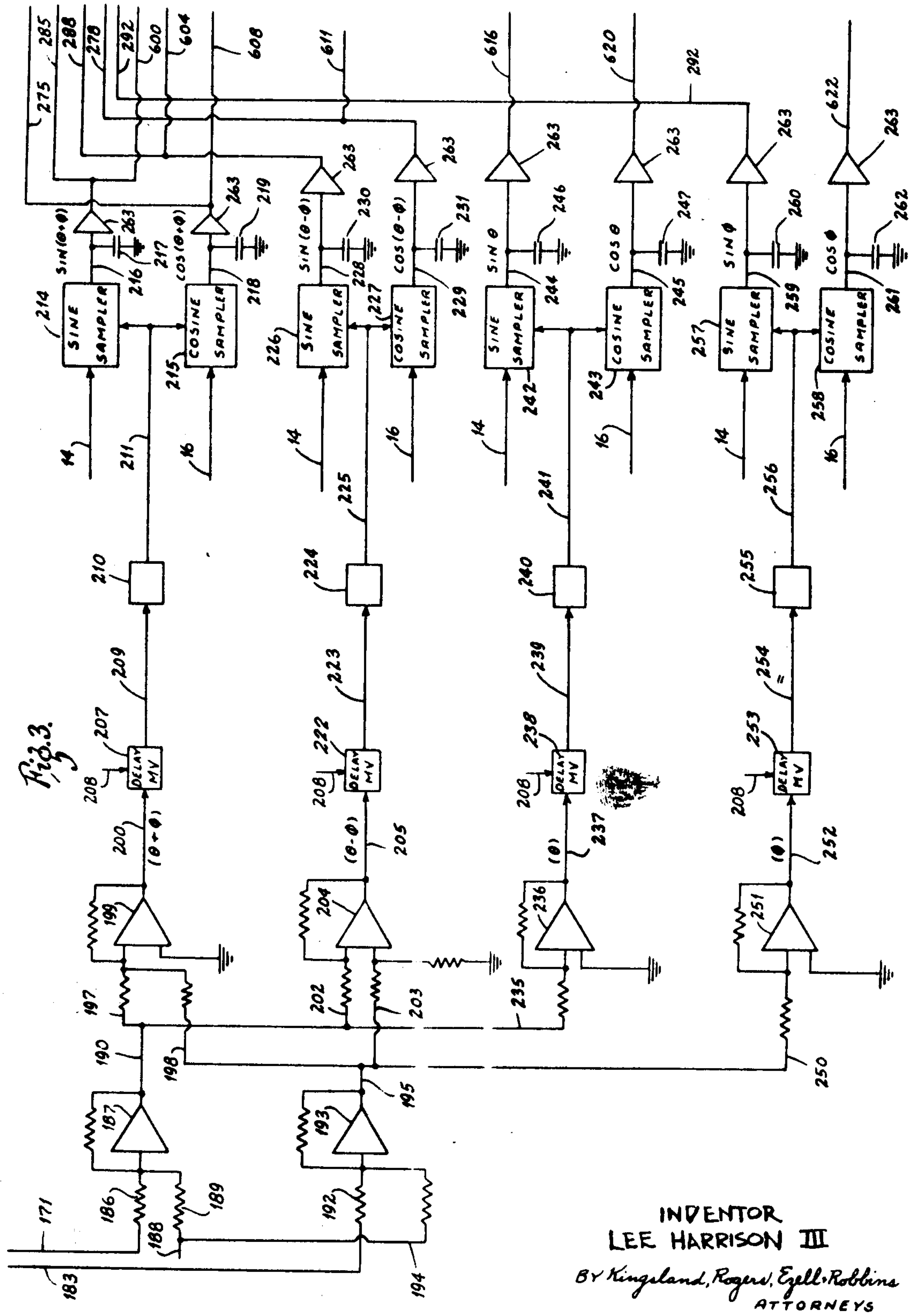


Fig. 2.

INVENTOR
LEE HARRISON III
BY Kingsland, Rogers, Ezell & Robbins
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AUTOMATIC GENERATION AND DISPLAY OF ANIMATED FIGURES

Original Filed Nov. 29, 1962



INVENTOR
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BY Kingsland, Rogers, Ezell & Robbins
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AUTOMATIC GENERATION AND DISPLAY OF ANIMATED FIGURES

Original Filed Nov. 29, 1962 12 Sheets-Sheet 4

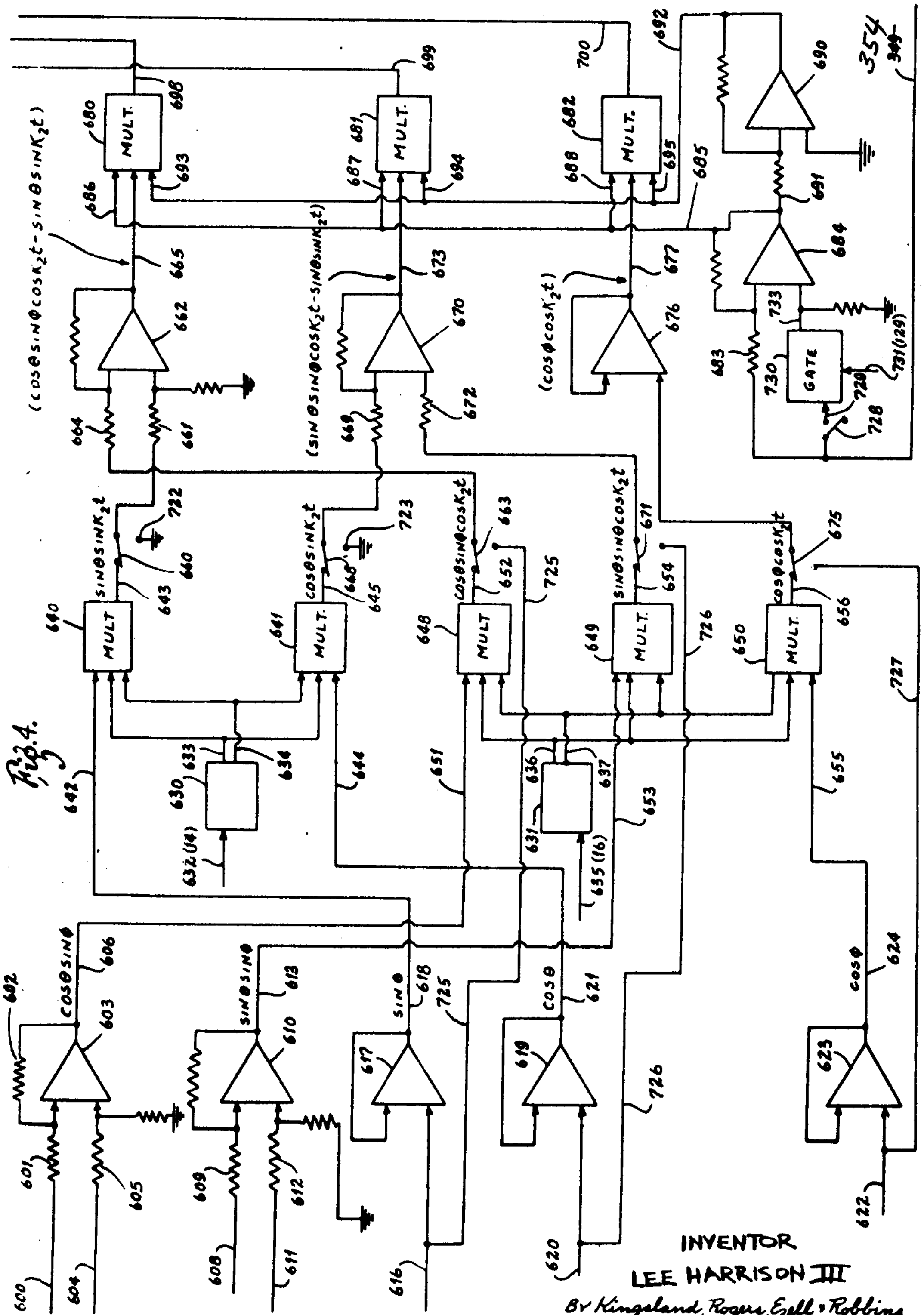


Fig. 4.

INVENTOR
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BY Kingsland, Rogers, Ezell & Robbins
ATTORNEYS

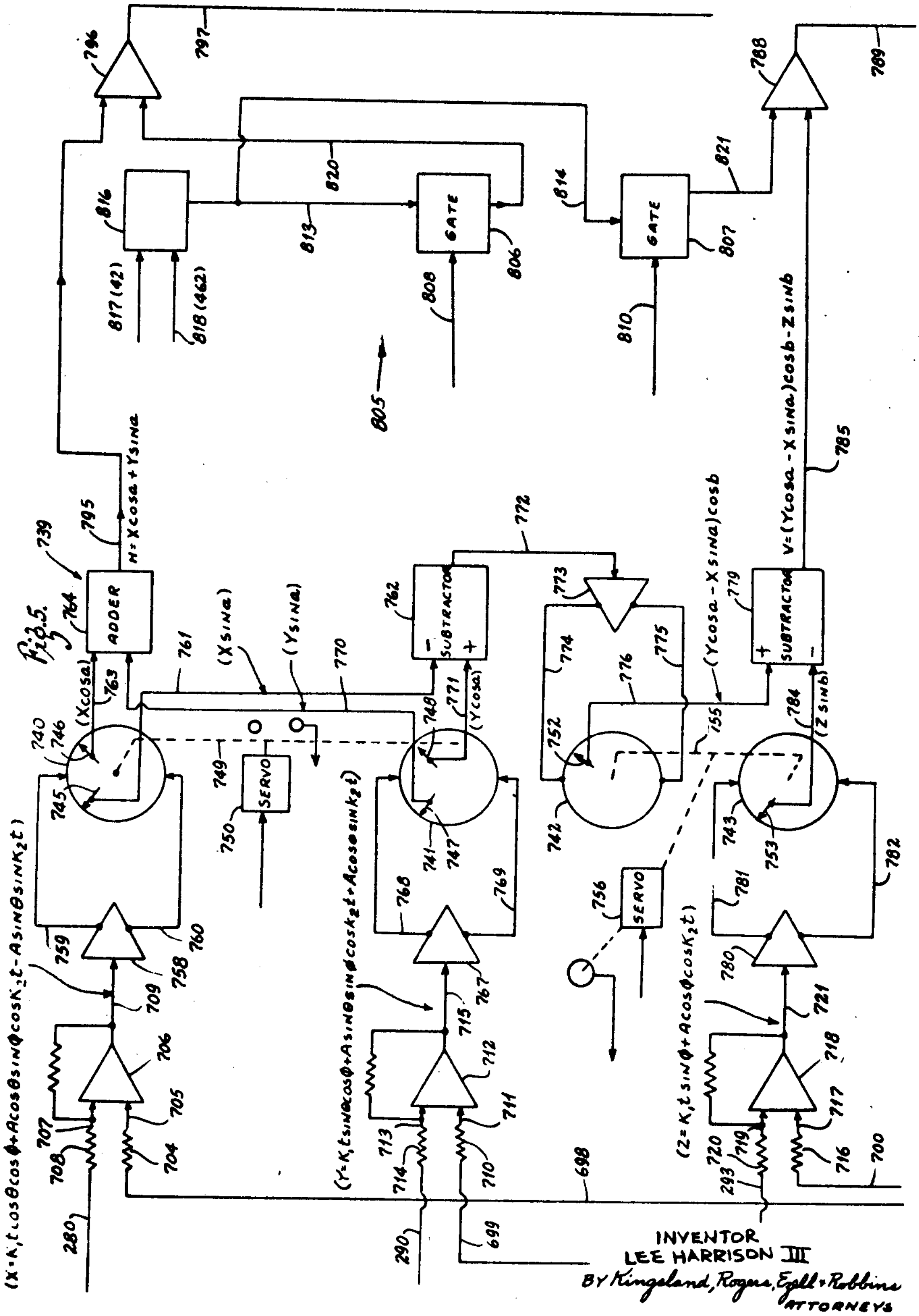
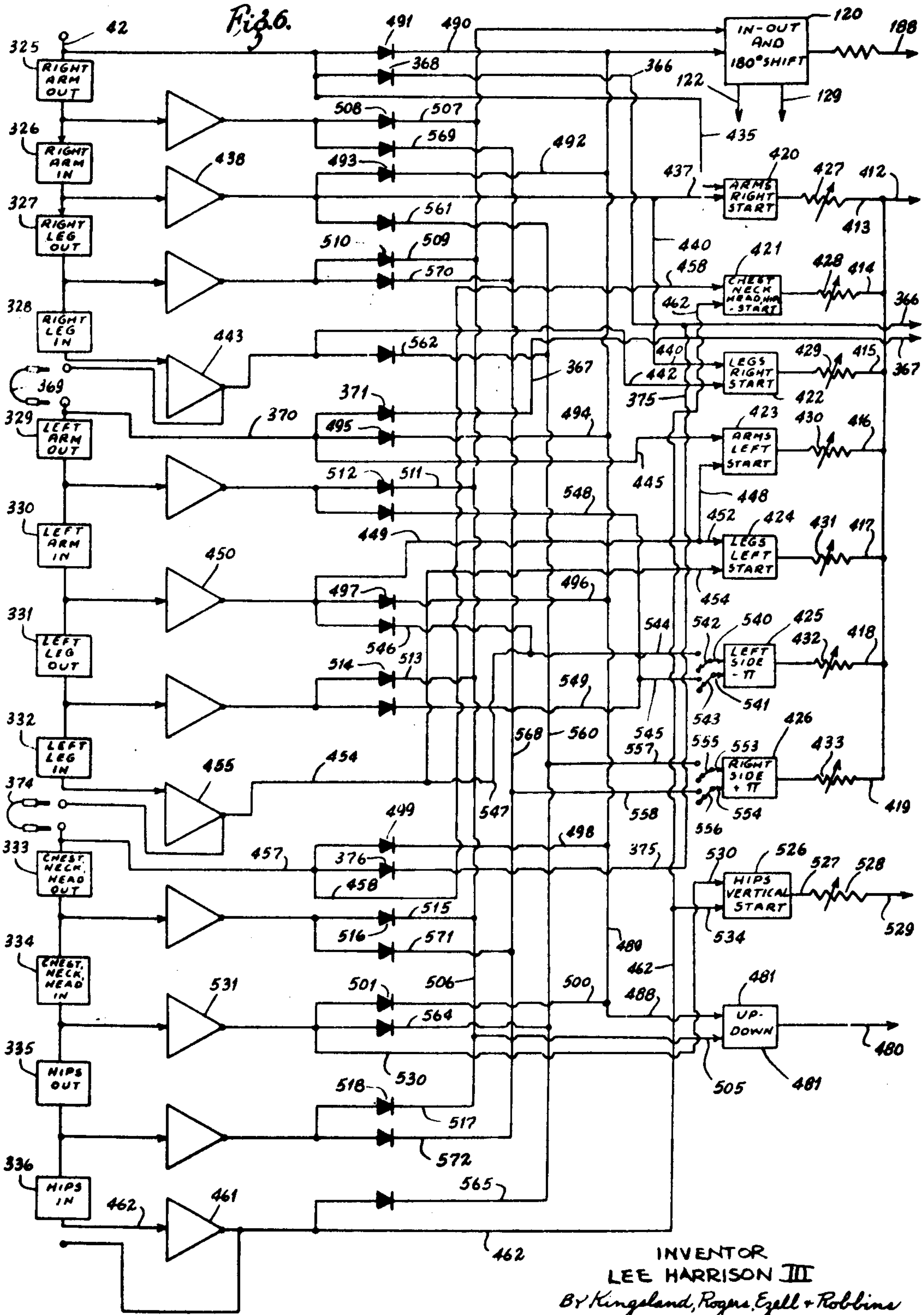


Fig. 5.

INVENTOR
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Fig. 6.

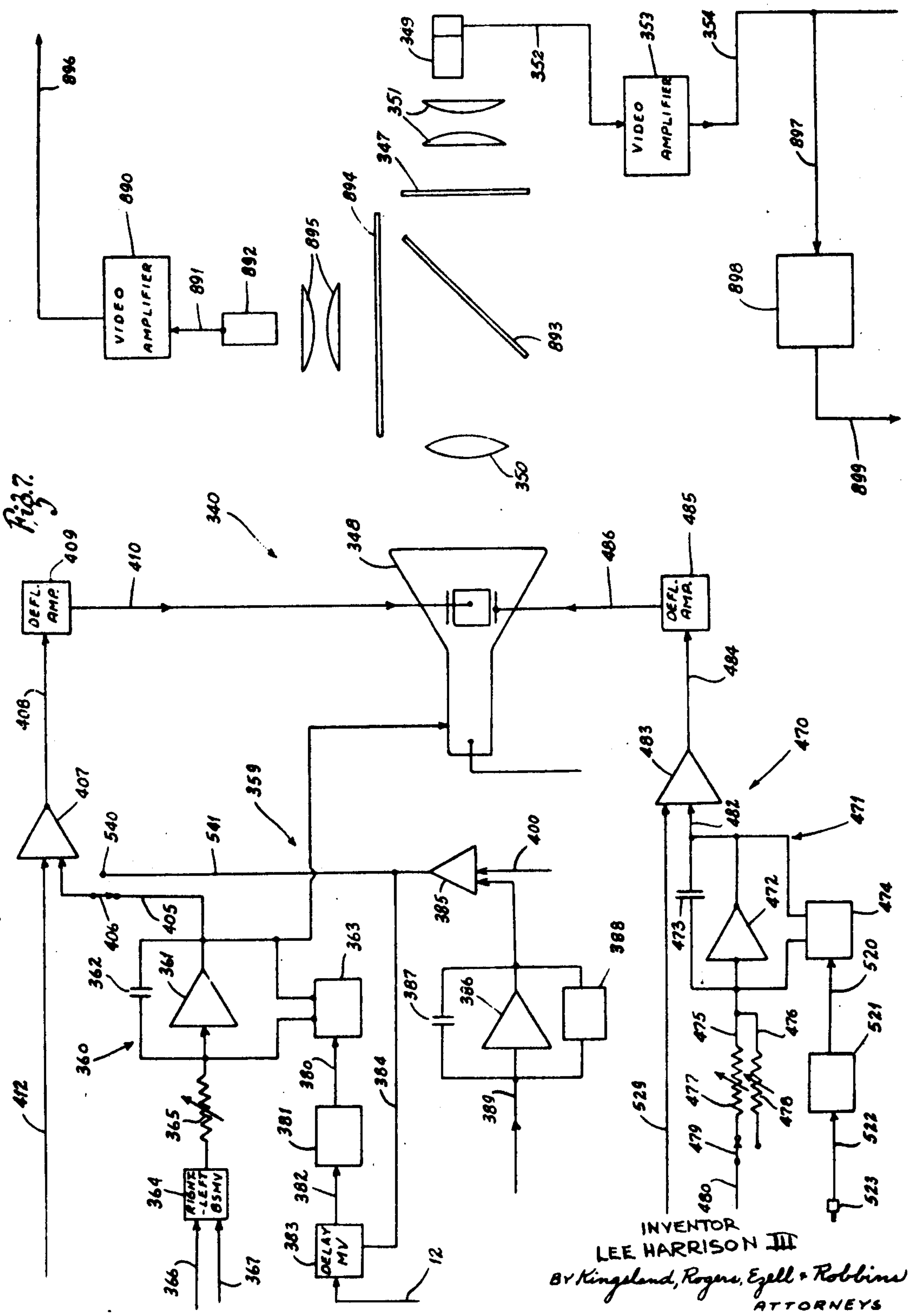


INVENTOR
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BY Kingsland, Rogers, Ezell & Robbins
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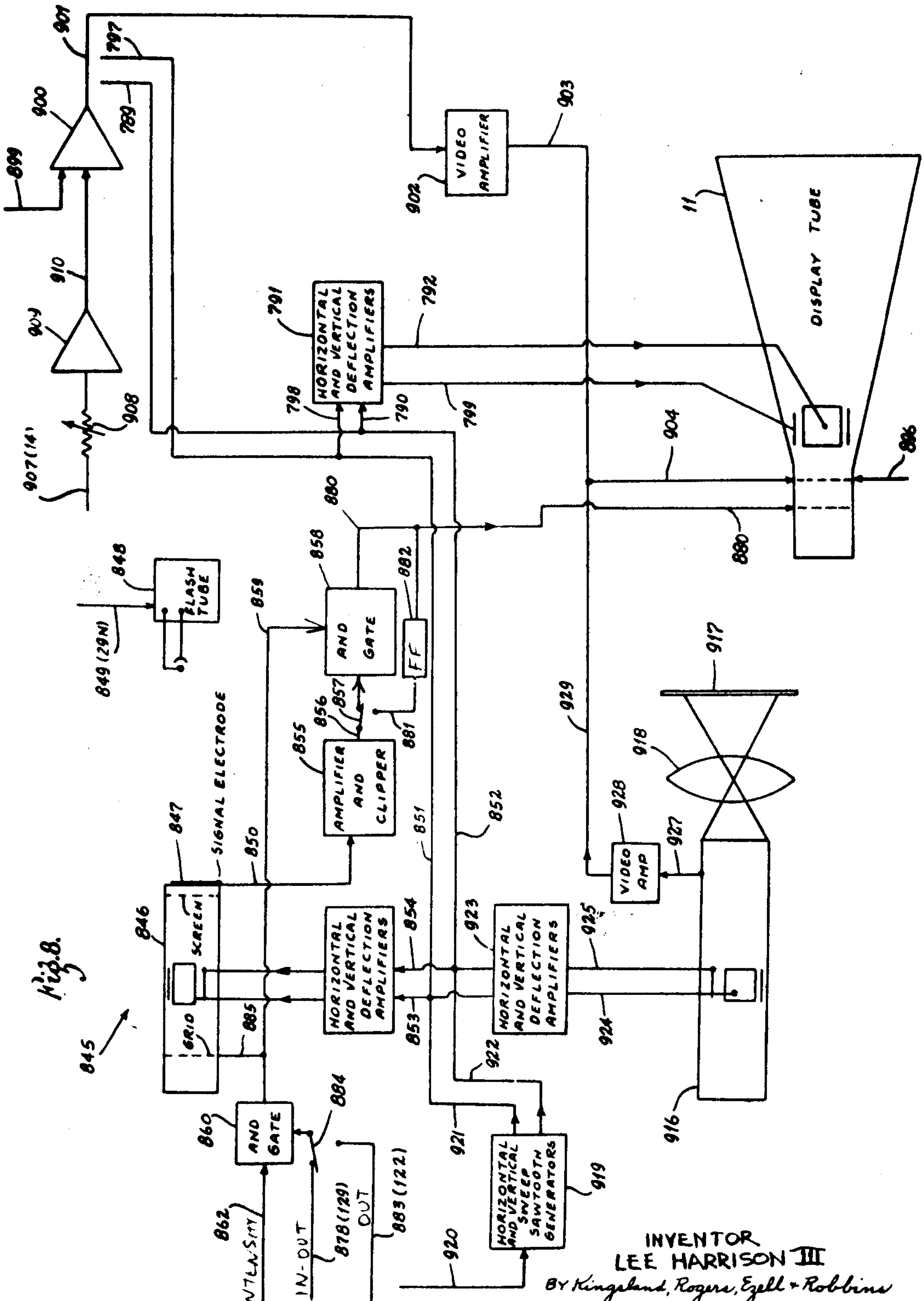
Jan. 16, 1968 L. HARRISON III 3,364,382

AUTOMATIC GENERATION AND DISPLAY OF ANIMATED FIGURES

Original Filed Nov. 29, 1962 12 Sheets-Sheet 7



INVENTOR
LEE HARRISON III
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BY Kingsland, Rogers, Ezell & Robbins
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Jan. 16, 1968 L. HARRISON III 3,364,382

AUTOMATIC GENERATION AND DISPLAY OF ANIMATED FIGURES

Original Filed Nov. 29, 1962 12 Sheets-Sheet 9

Fig. 9.

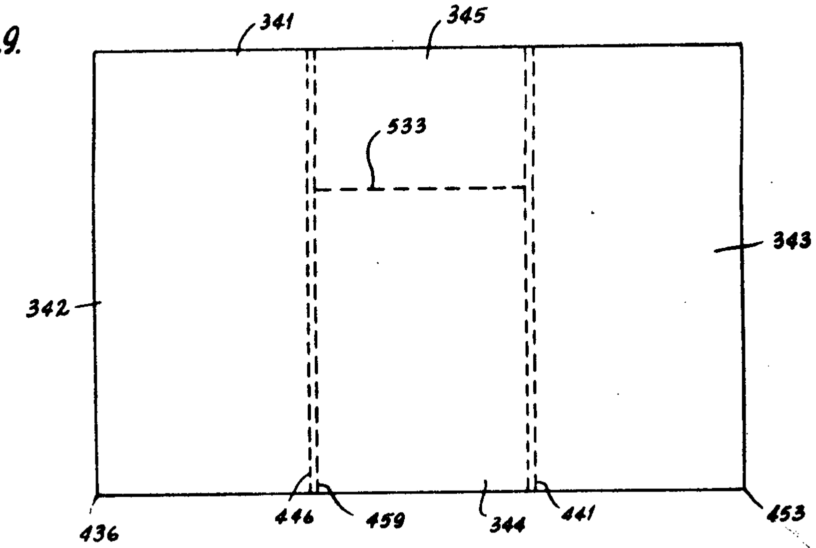
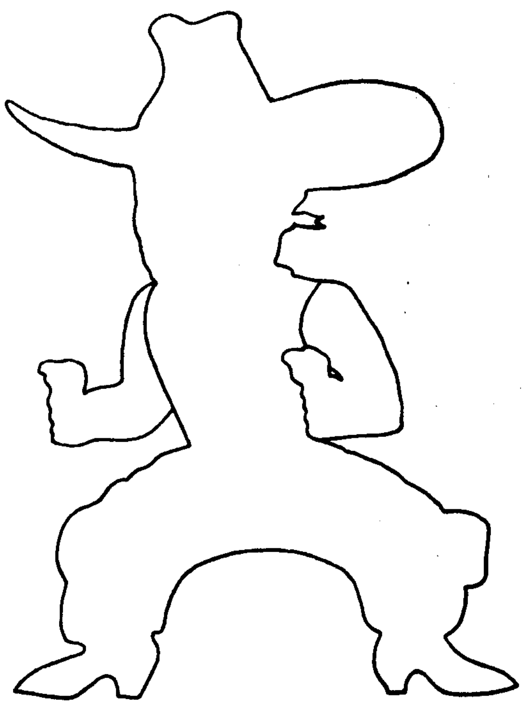


Fig. 19.



Fig. 20.



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Jan. 16, 1968 L. HARRISON III **3,364,382**

AUTOMATIC GENERATION AND DISPLAY OF ANIMATED FIGURES

Original Filed Nov. 29, 1962 12 Sheets-Sheet 10

Fig. 10.

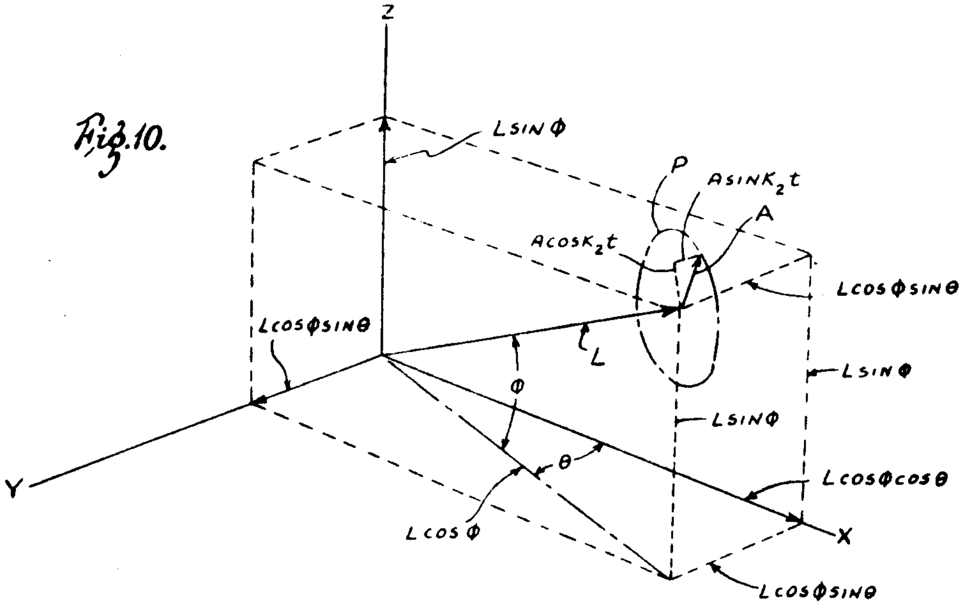


Fig. 11.

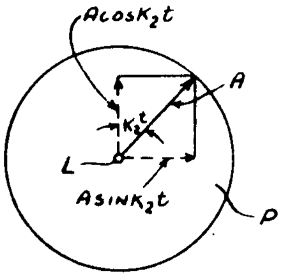


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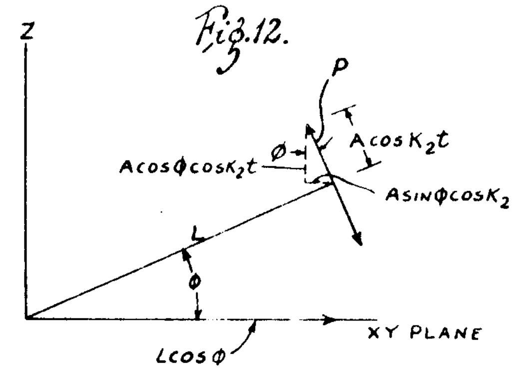


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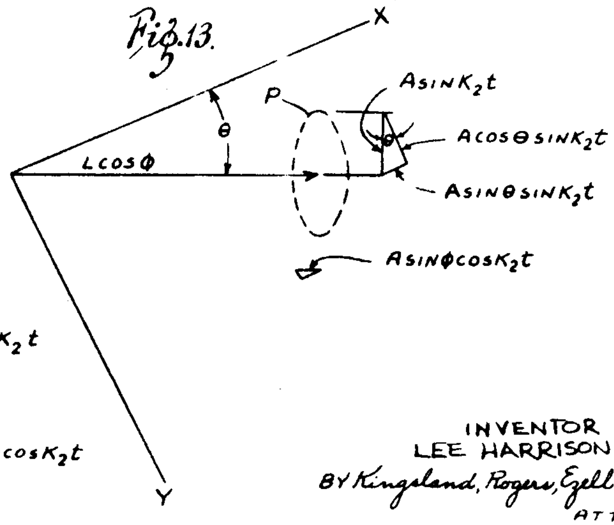
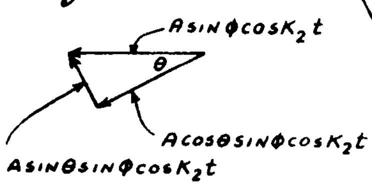


Fig. 14.



INVENTOR
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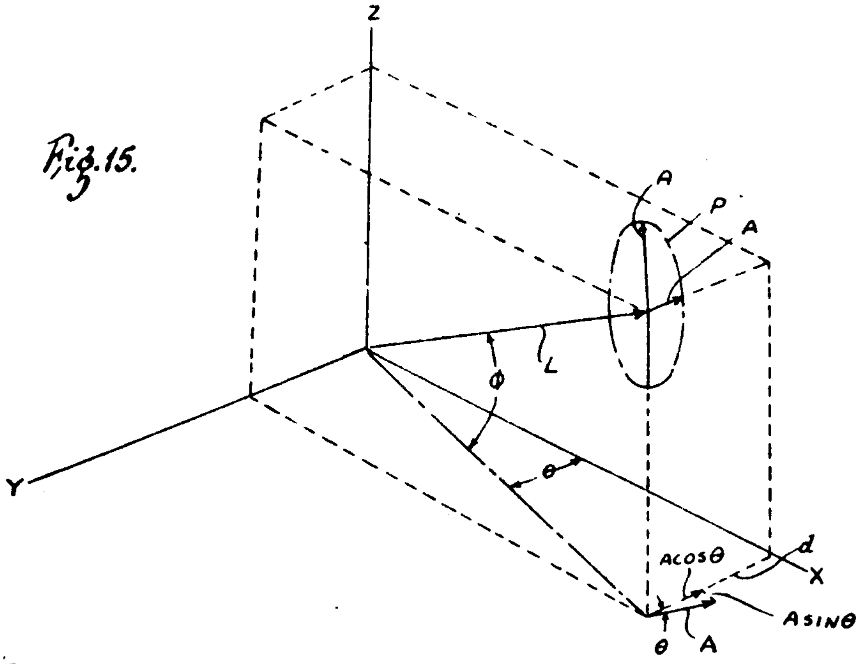


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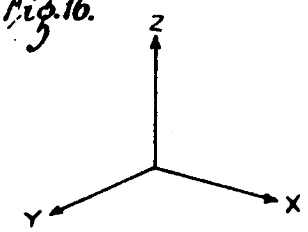


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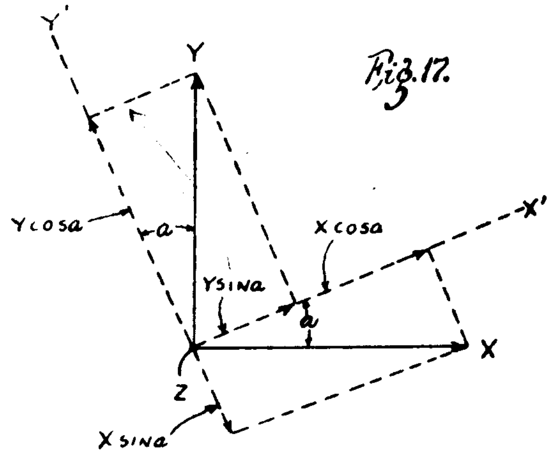


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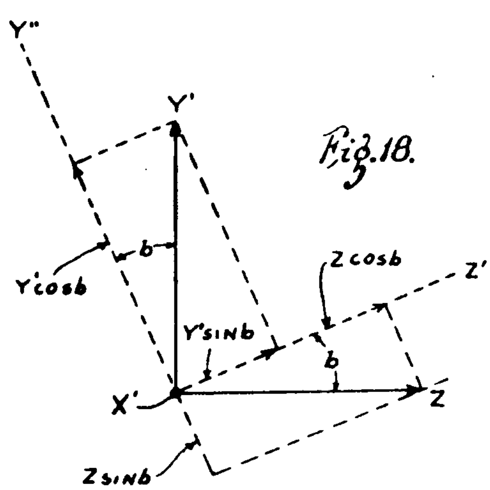


Fig.18.

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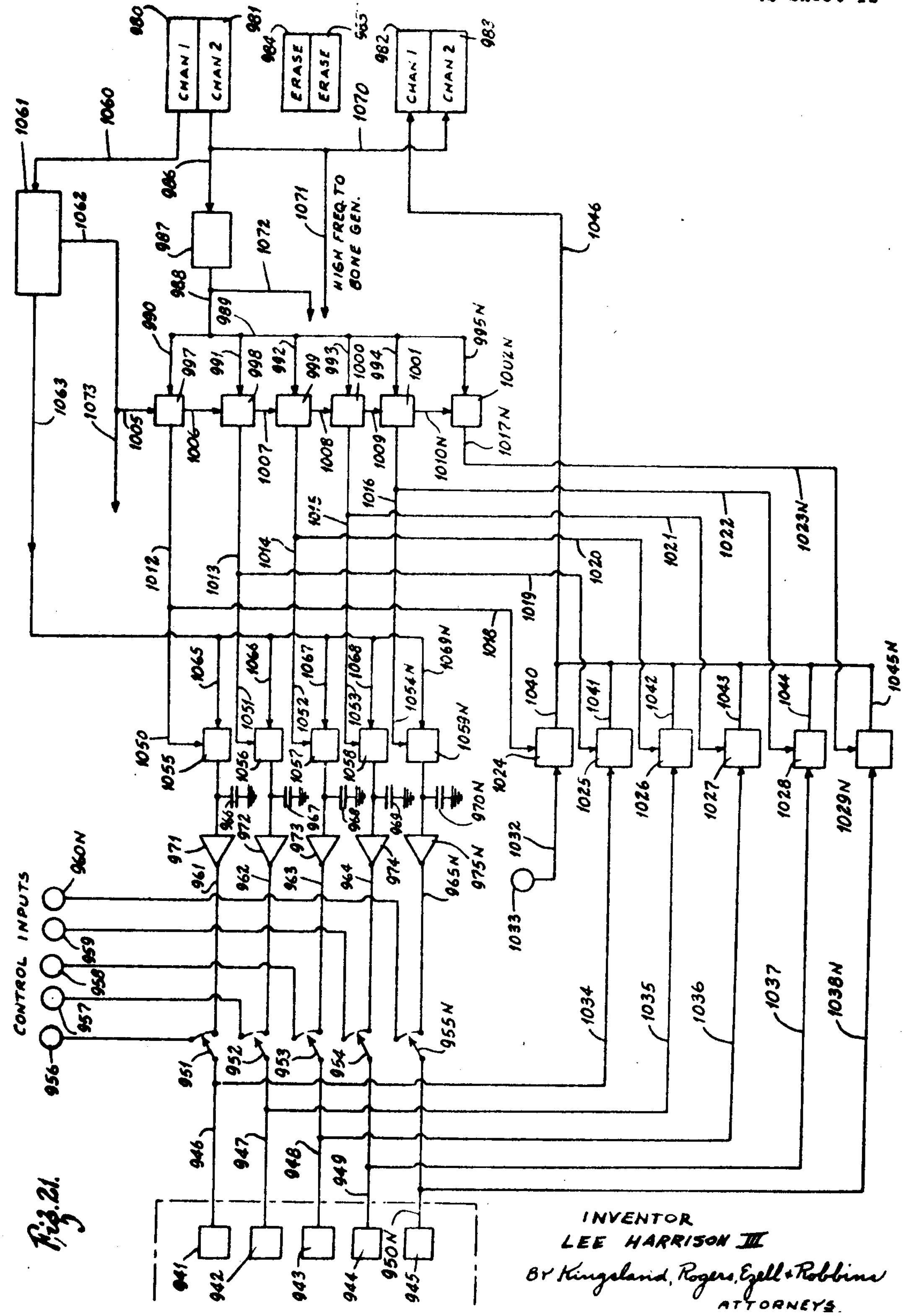
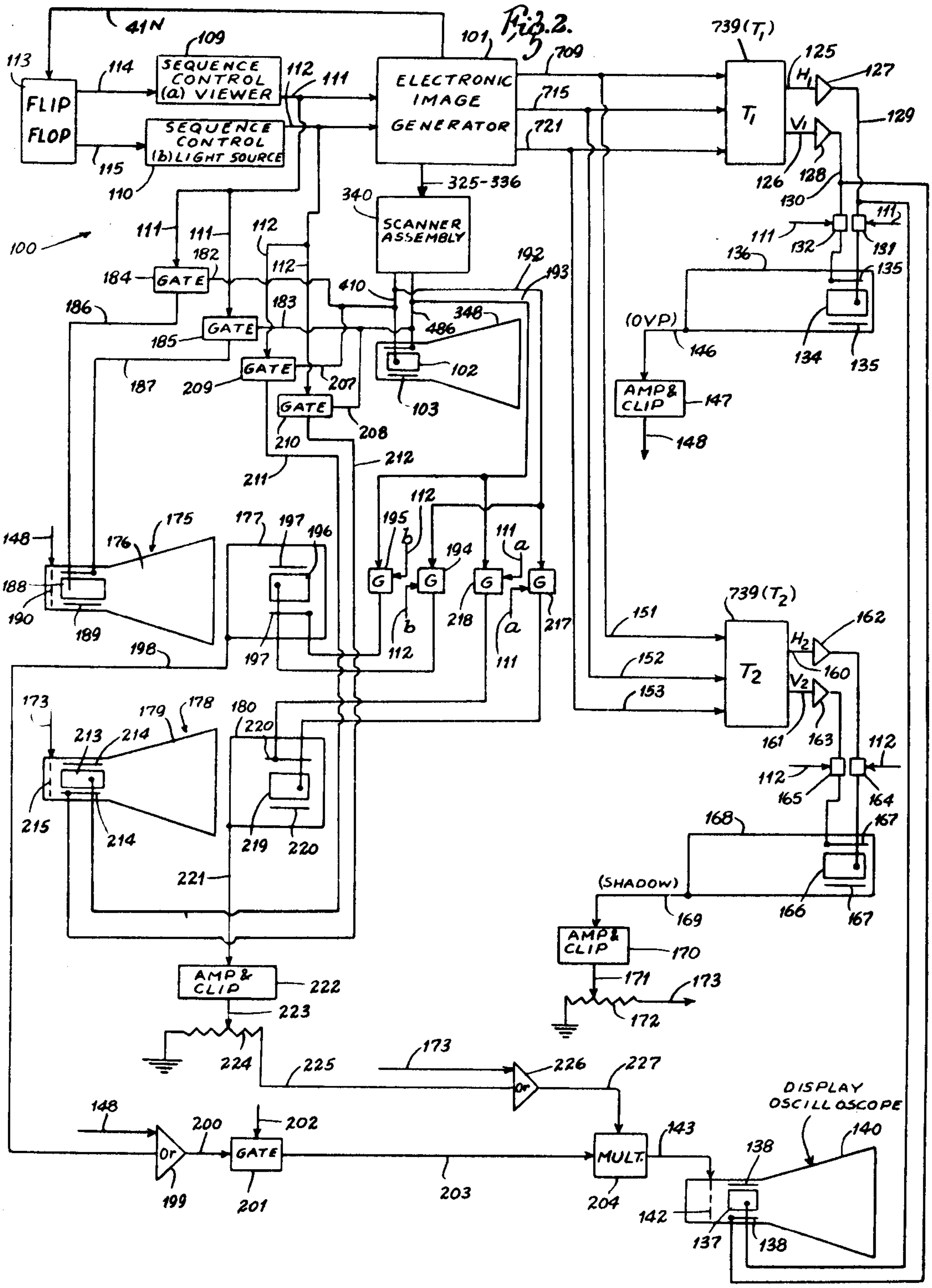


Fig. 21.

INVENTOR
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Fig. 2.

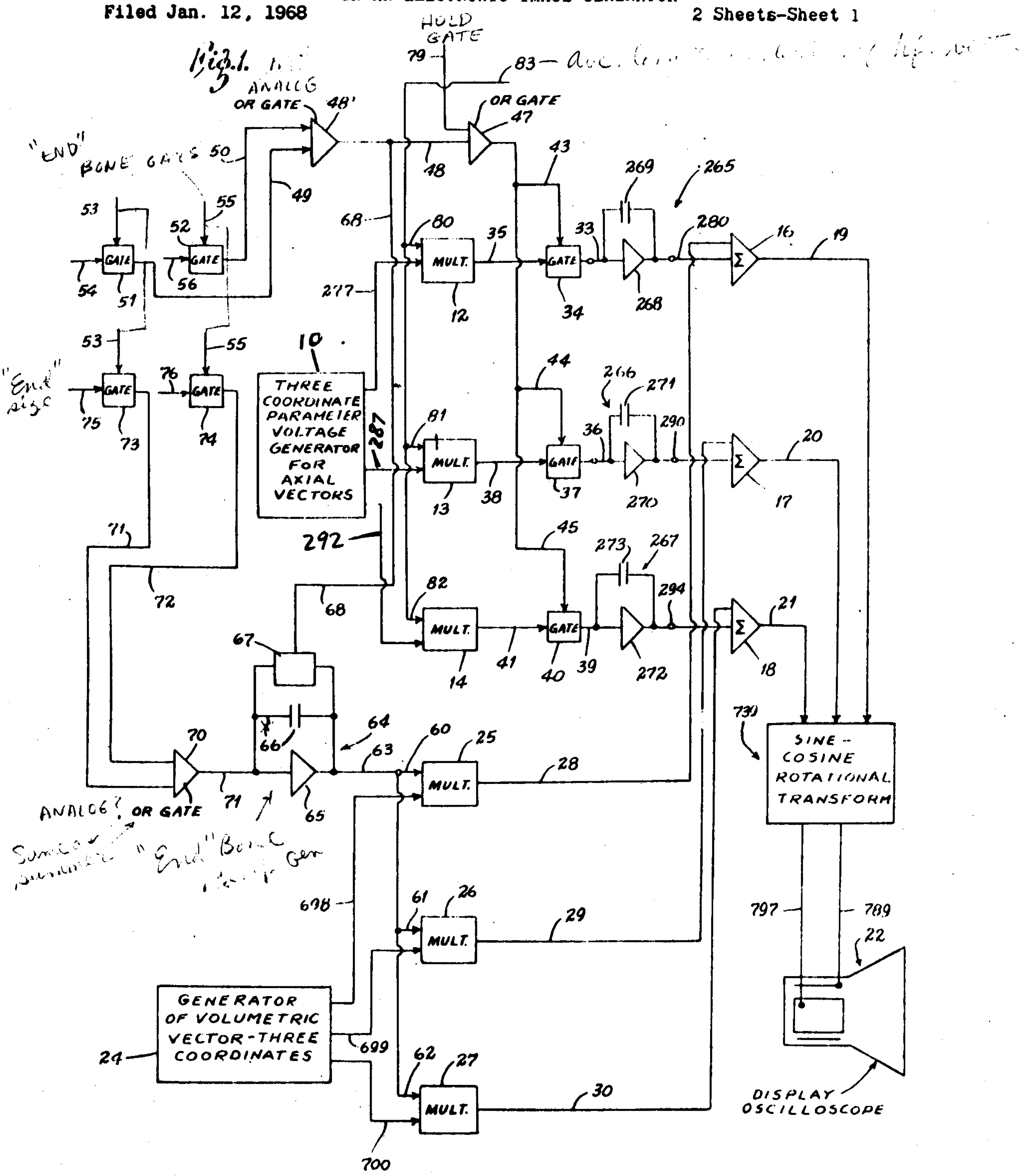


INVENTOR:
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BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS

Aug. 5, 1969 L. HARRISON III 3,459,991

MEANS AND METHOD FOR CONTROLLING SURFACE RESOLUTION AT CERTAIN POINTS ON MEMBERS OF FIGURES PRODUCED IN AN ELECTRONIC IMAGE GENERATOR

Filed Jan. 12, 1968 2 Sheets-Sheet 1



INVENTOR:
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ATTORNEYS

Aug. 5, 1969 L. HARRISON III **3,459,991**

MEANS AND METHOD FOR CONTROLLING SURFACE RESOLUTION AT CERTAIN POINTS ON MEMBERS OF FIGURES PRODUCED IN AN ELECTRONIC IMAGE GENERATOR

Filed Jan. 12, 1968 2 Sheets-Sheet 2

Fig. 2.

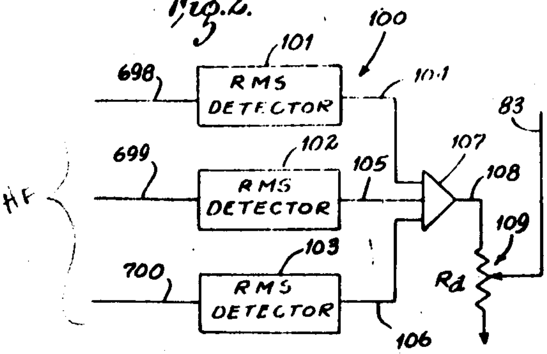
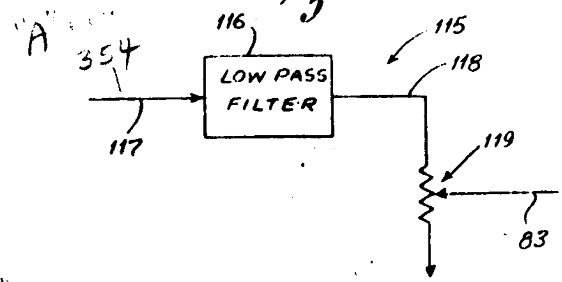


Fig. 3.



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Fig. 4.

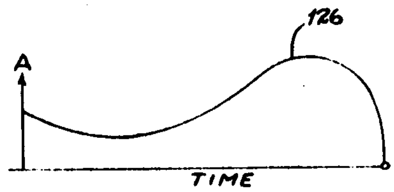


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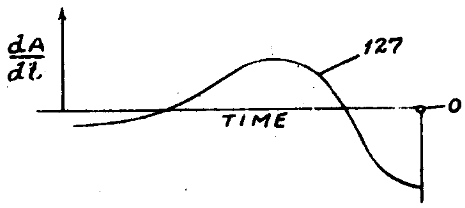


Fig. 6.

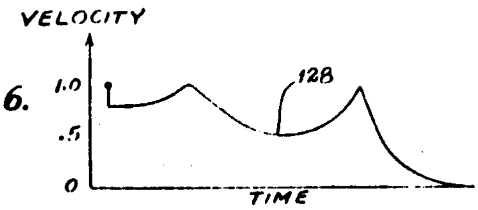
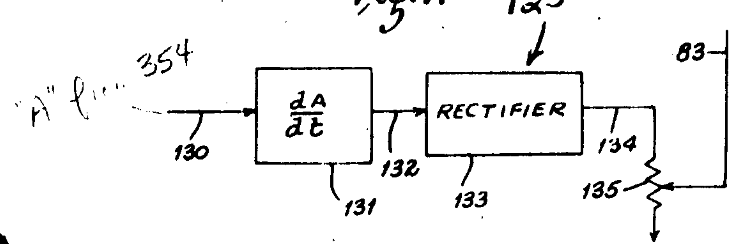


Fig. 7.



INVENTOR:
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BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS

Dec. 9, 1969 L. HARRISON III 3,483,426

MEANS AND METHOD FOR AUTOMATICALLY GENERATING PERSPECTIVE IN AN ELECTRONIC IMAGE DISPLAY

Filed Jan. 12, 1968 2 Sheets-Sheet 1

Fig. 1.

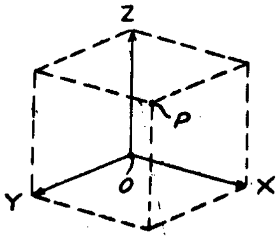


Fig. 2.

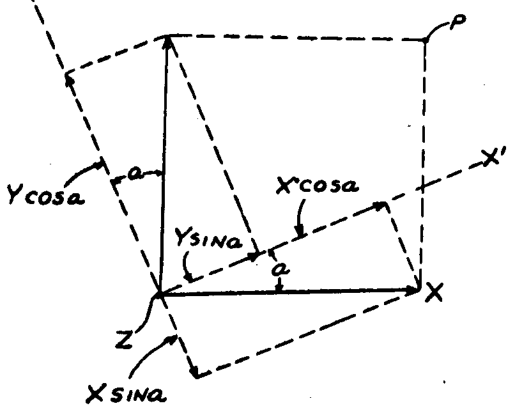


Fig. 3.

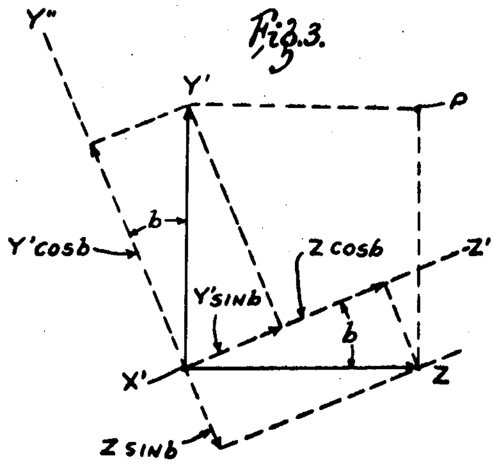
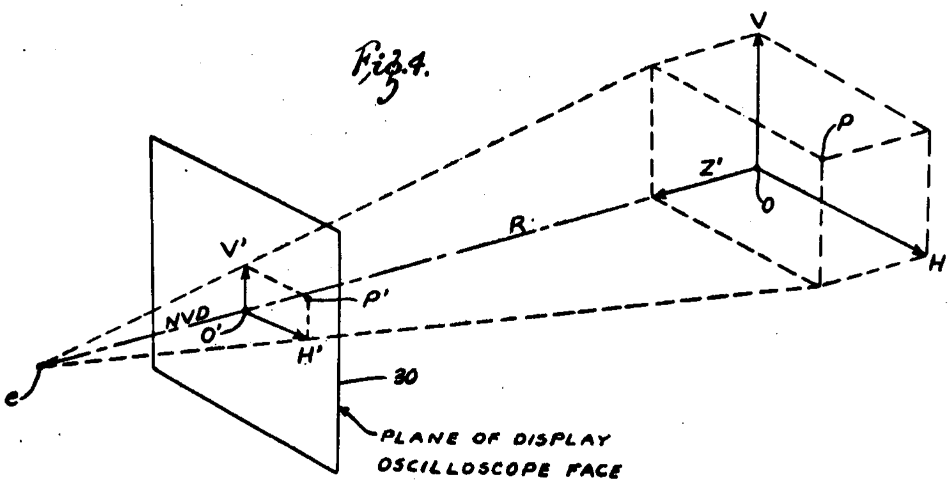


Fig. 4.



INVENTOR:
LEE HARRISON III

BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS

Fig. 5.

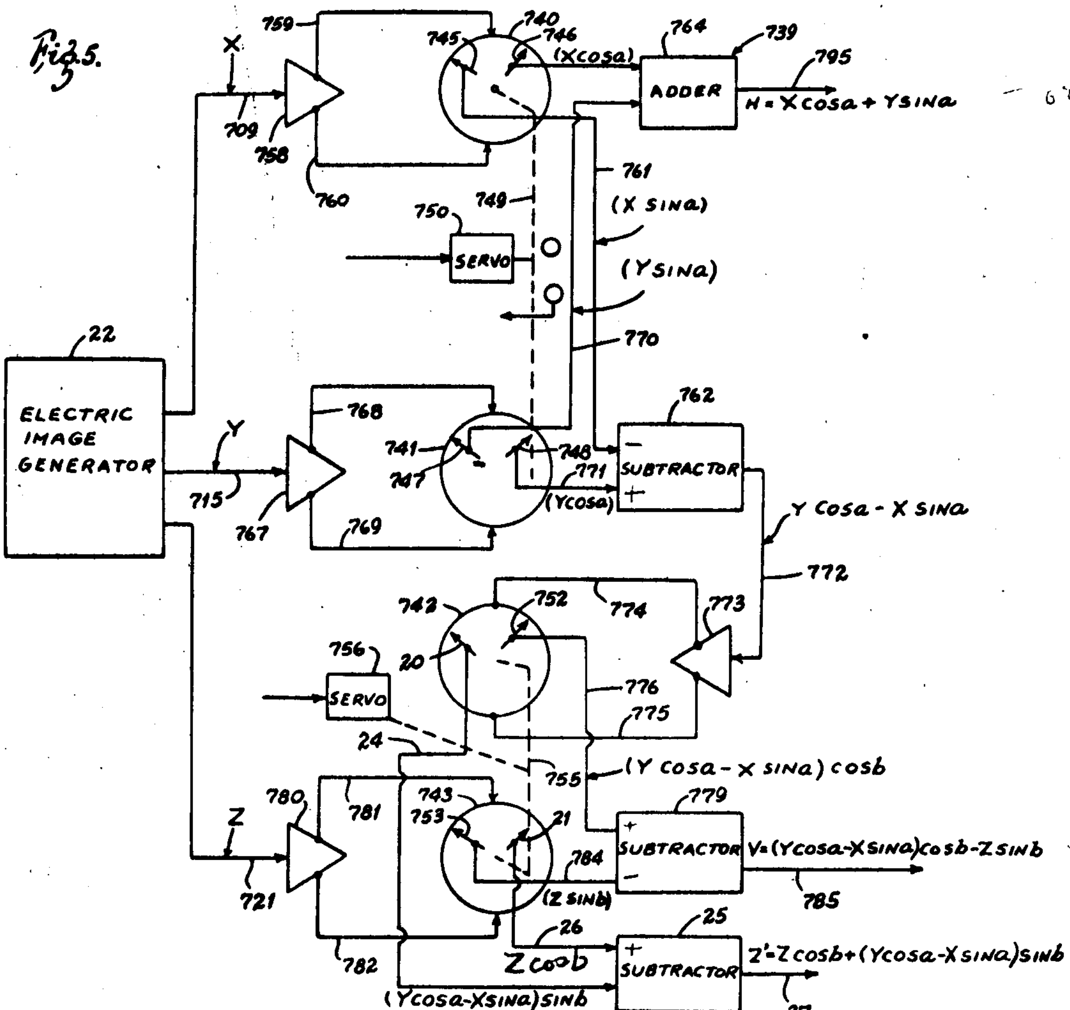
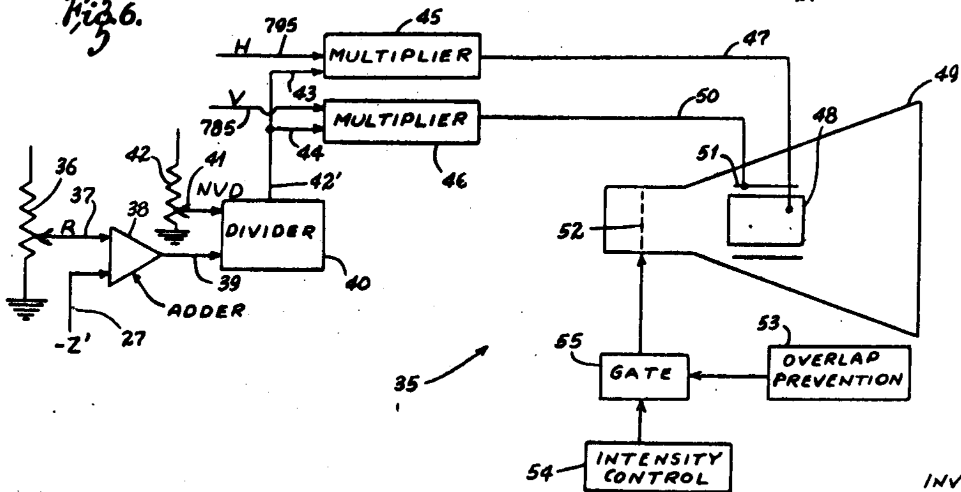


Fig. 6.

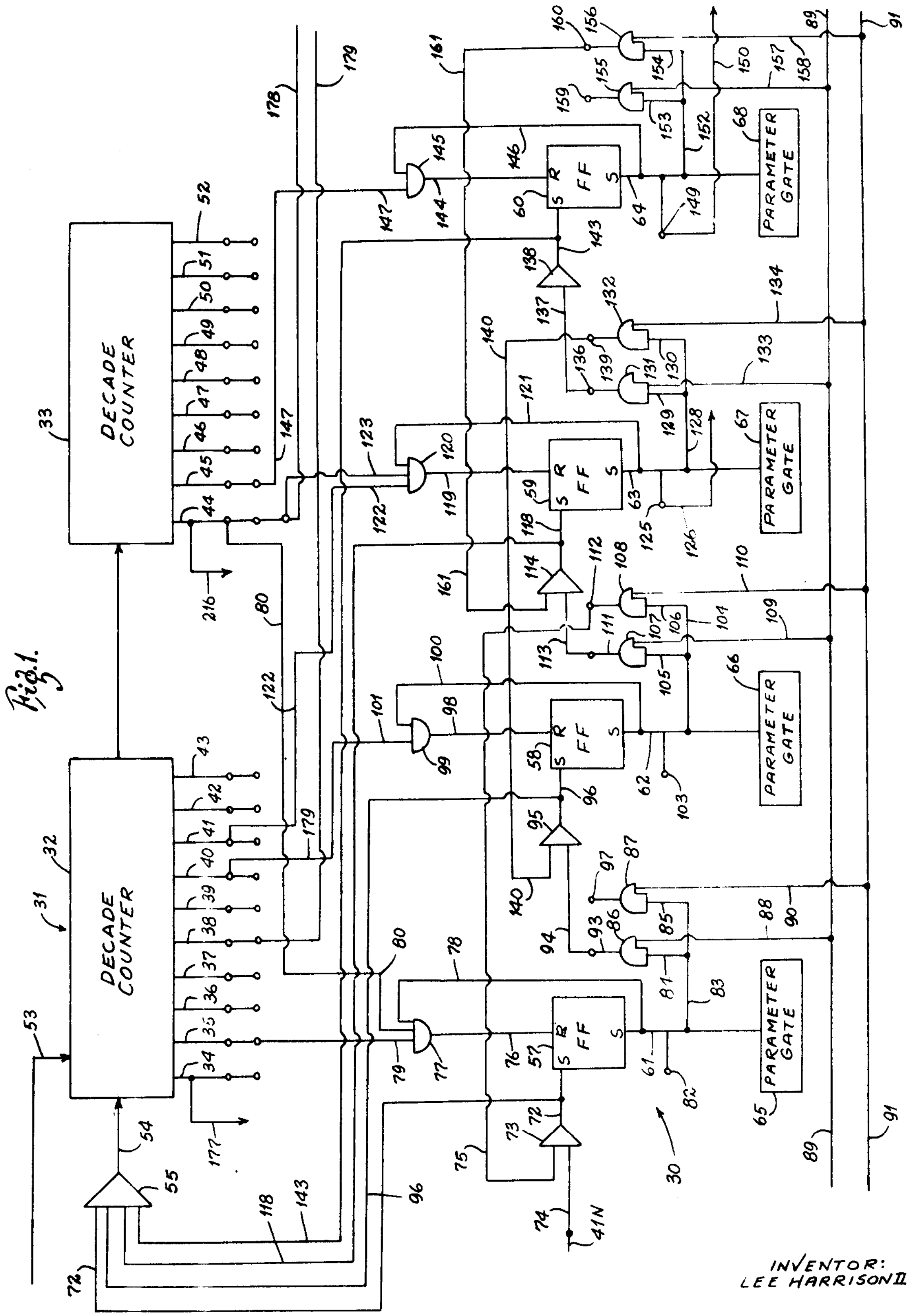


INVENTOR:
LEE HARRISON III
BY Kingsland, Rogers, Ezell, Eilers + Robbins
ATTORNEYS

Aug. 4, 1970 L. HARRISON III 3,523,289

APPARATUS FOR GENERATING A REPRESENTATION OF THE JUNCTION BETWEEN TWO SOLIDS IN A CATHODE RAY TUBE DISPLAY

Filed Jan. 15, 1968 2 Sheets-Sheet 1

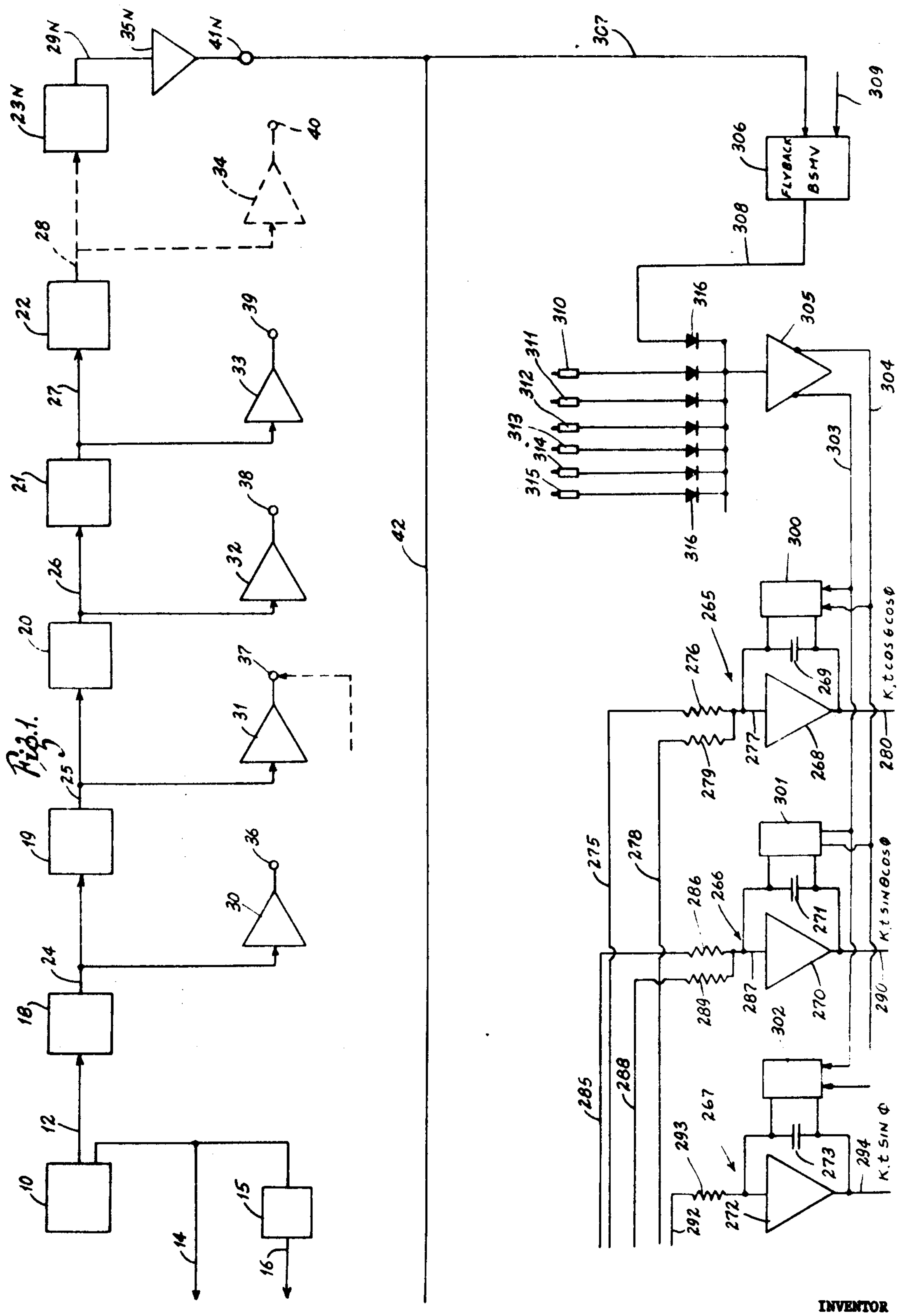


INVENTOR:
LEE HARRISON III

Sept. 8, 1970 L. HARRISON III 3,527,978

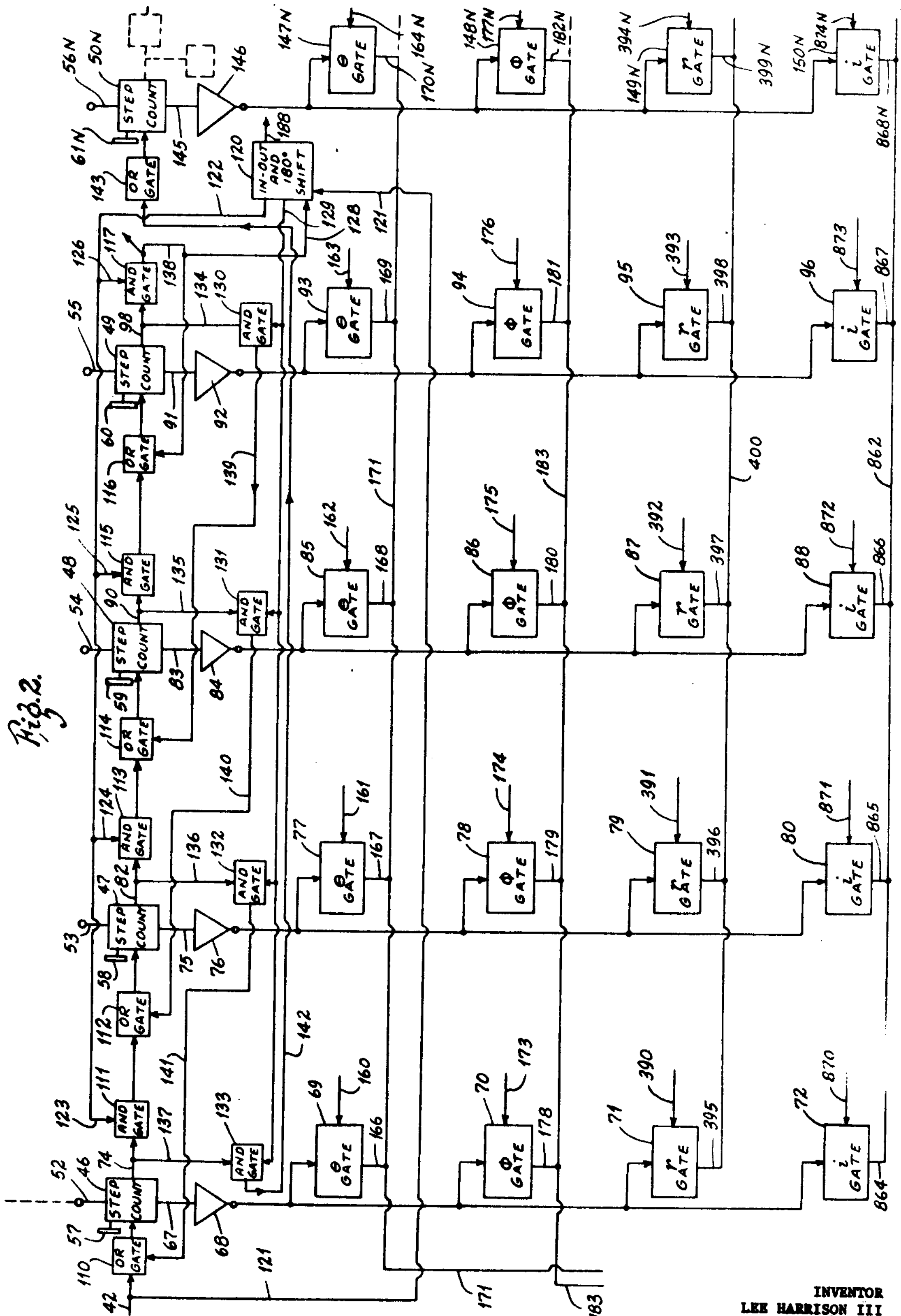
FILM PRODUCED BY AUTOMATIC GENERATION AND DISPLAY OF ANIMATED FIGURES

Filed Nov. 16, 1967 12 Sheets-Sheet 1

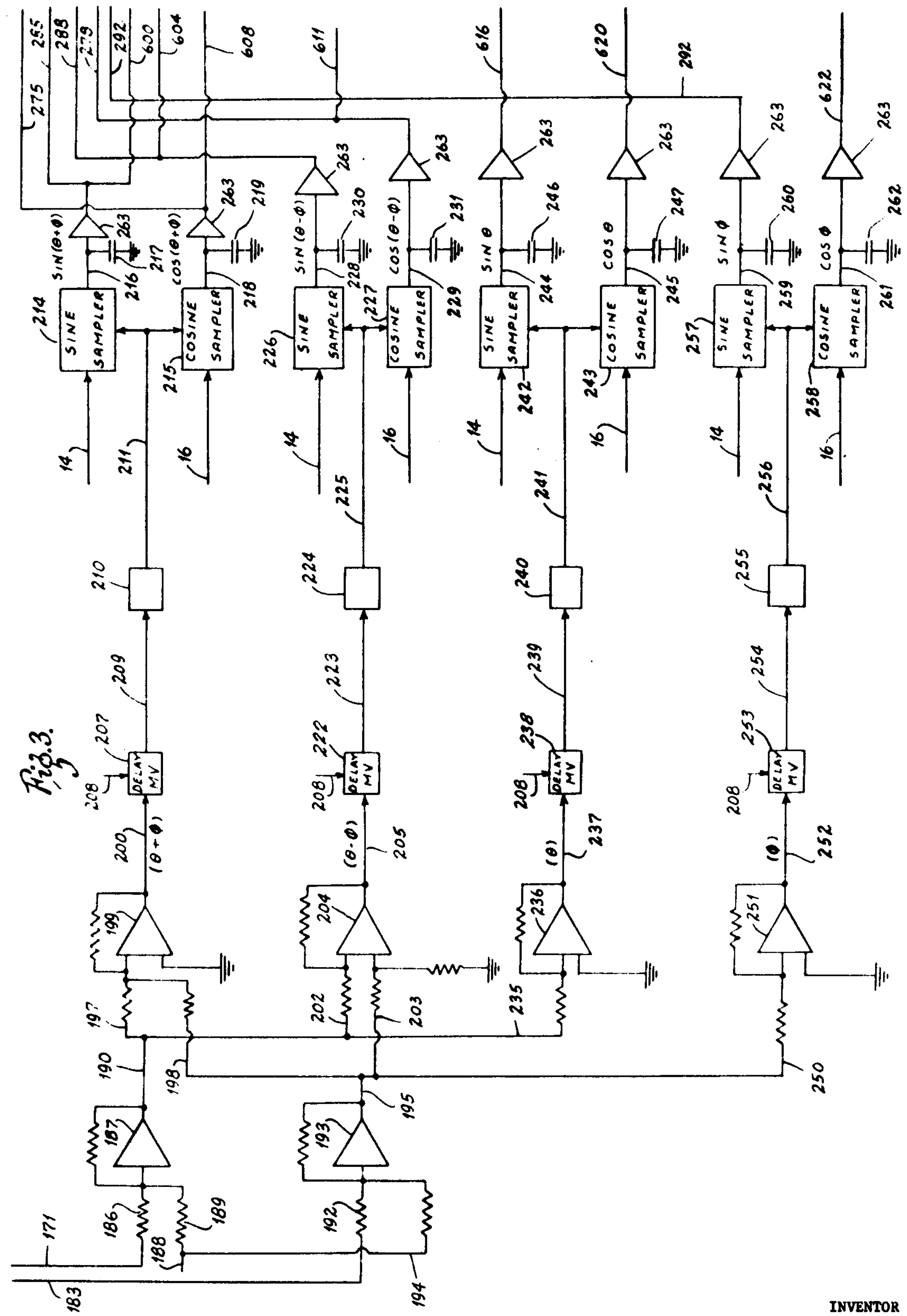


INVENTOR
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Fig. 2.



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INVENTOR
LEE HARRISON III
BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS

Sept. 8, 1970 L. HARRISON III 3,527,978

FILM PRODUCED BY AUTOMATIC GENERATION AND DISPLAY OF ANIMATED FIGURES

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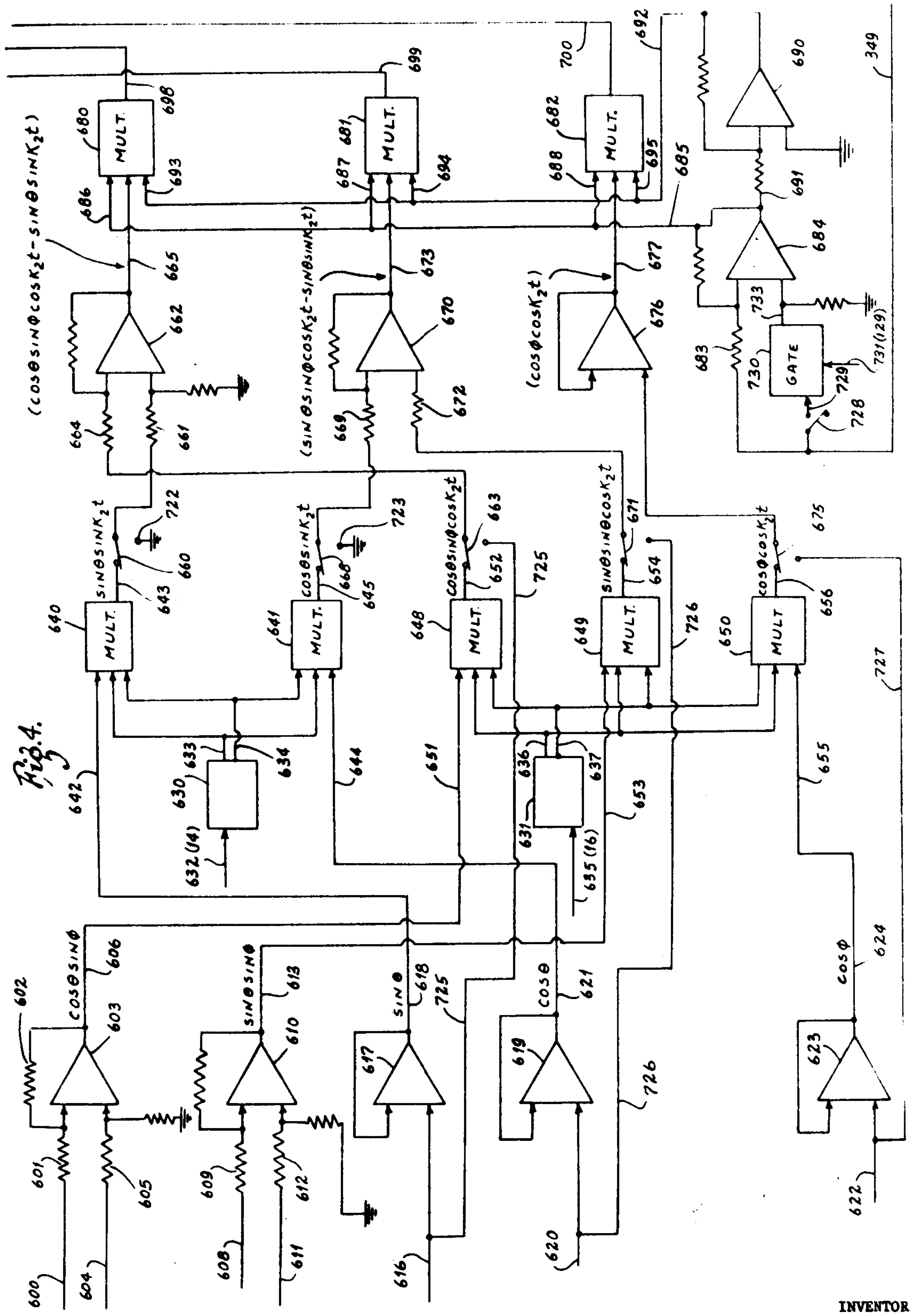
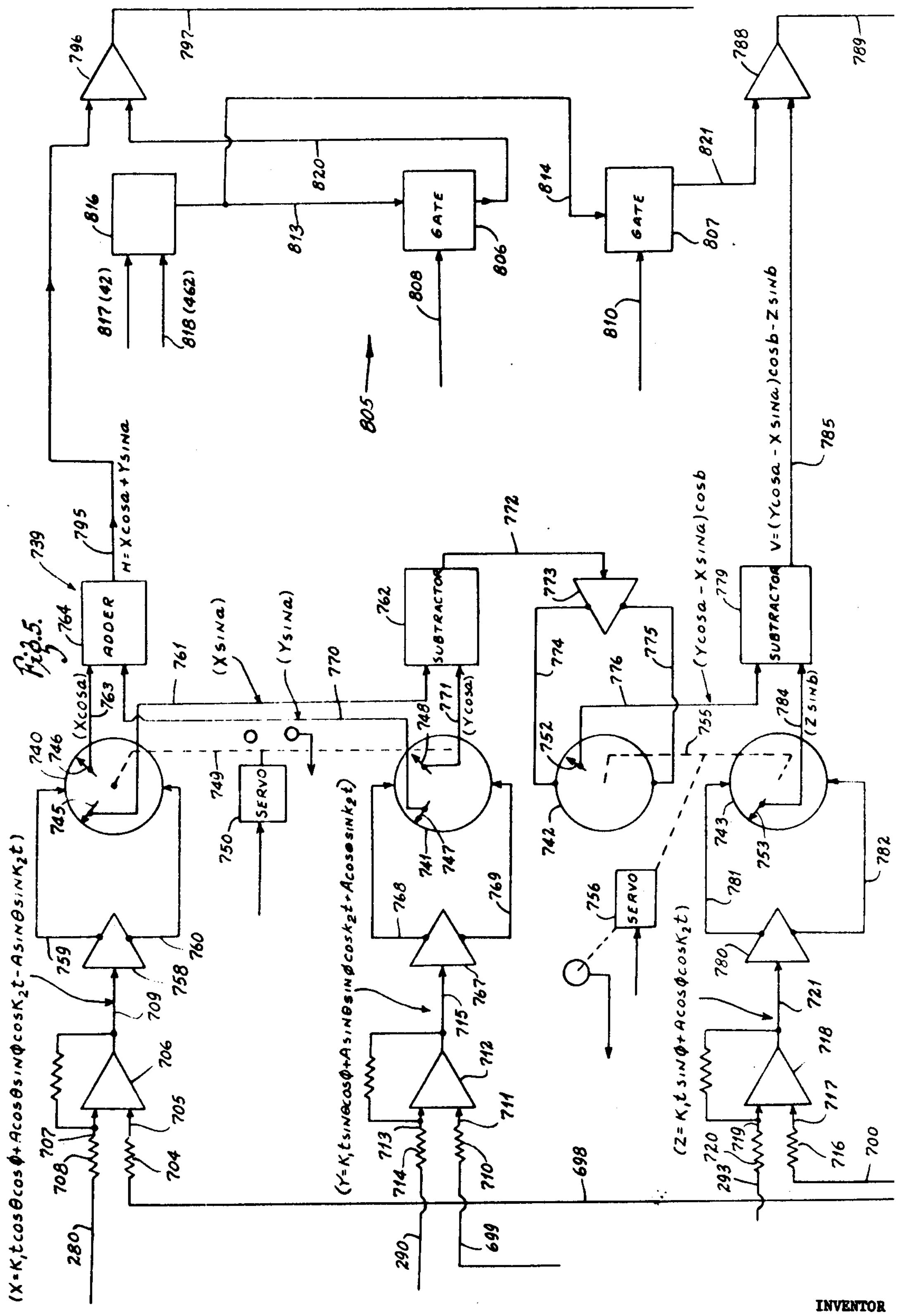


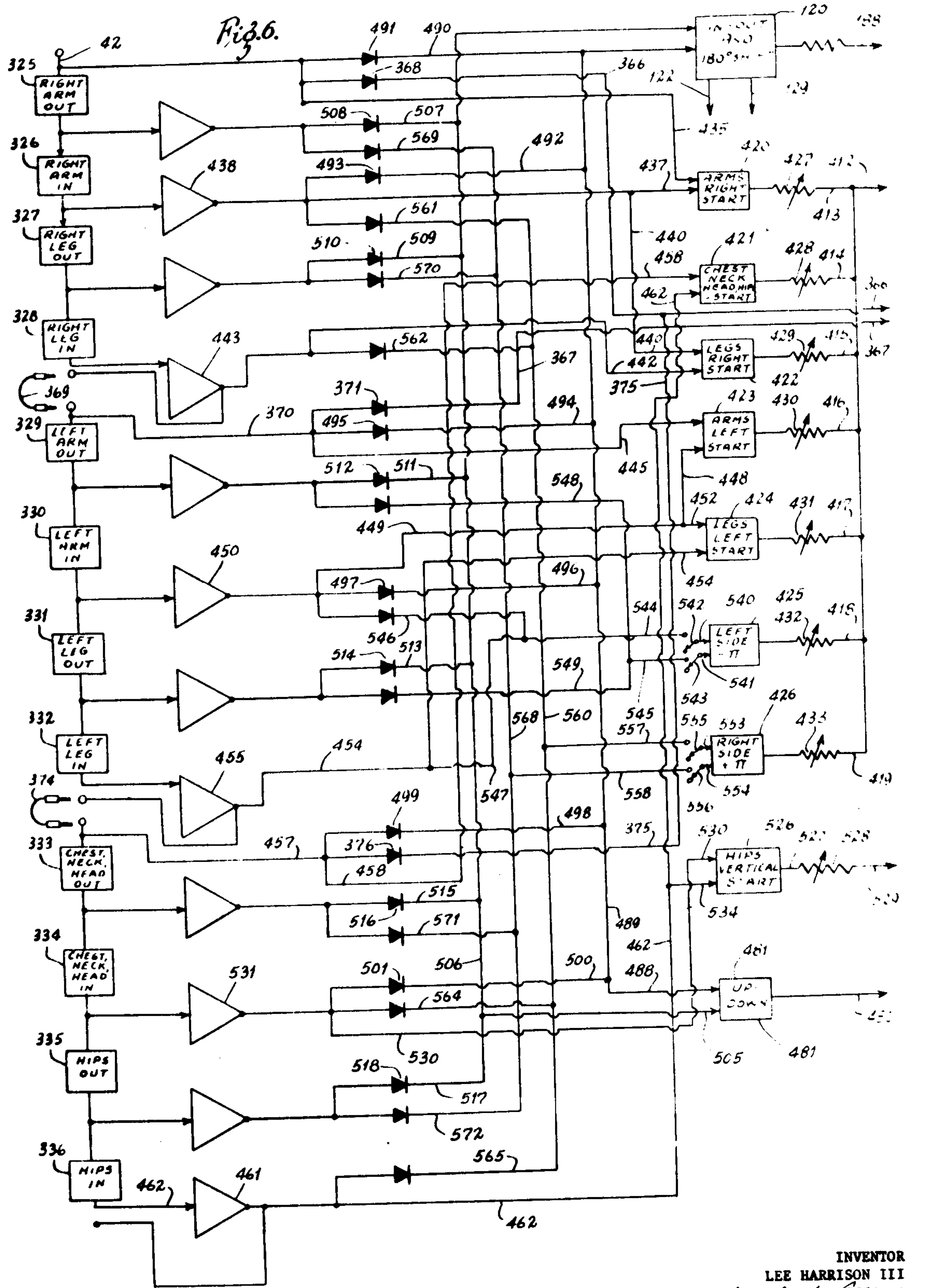
Fig. 4.

INVENTOR
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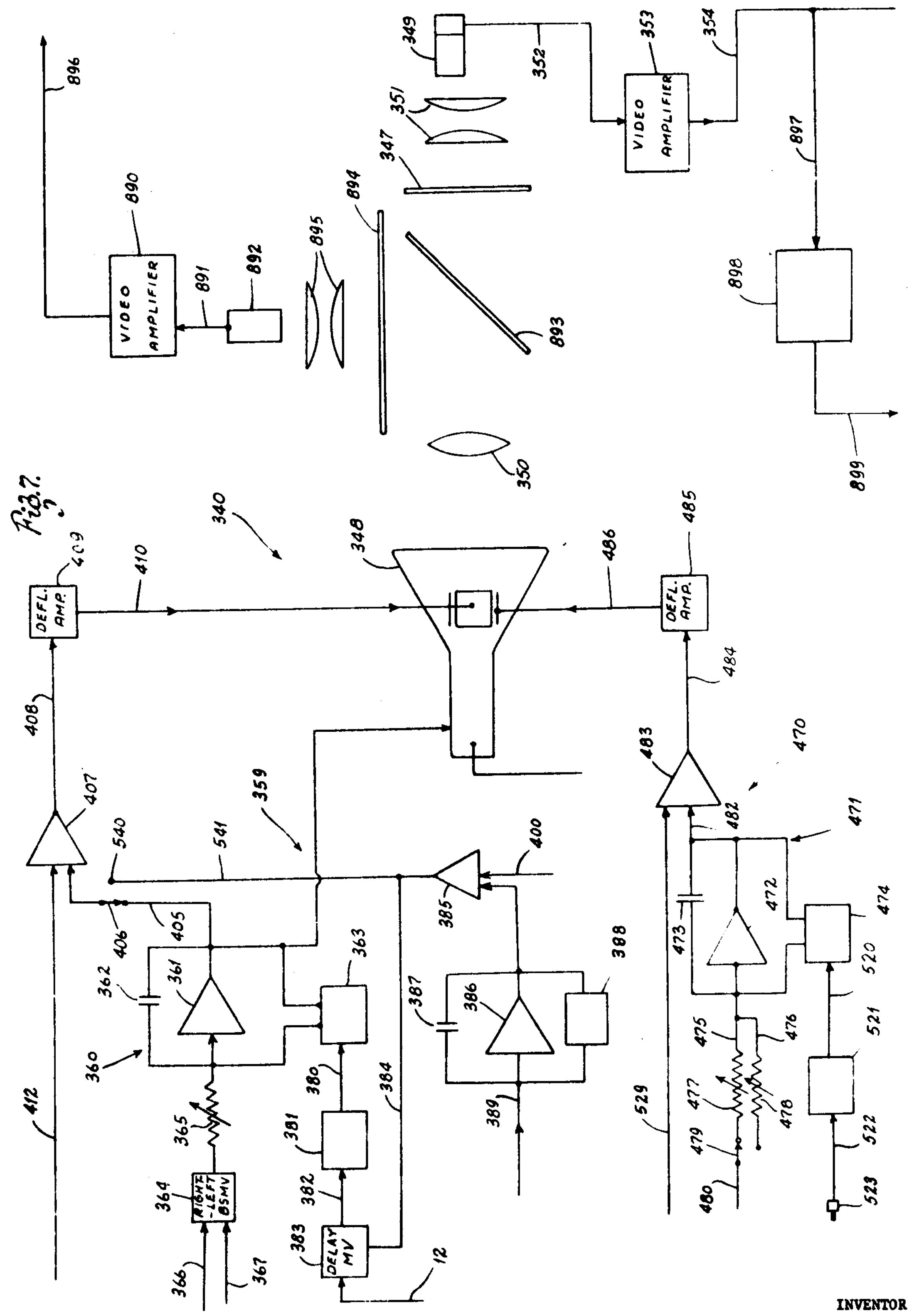
INVENTOR
LEE HARRISON III
BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS

Fig. 6.

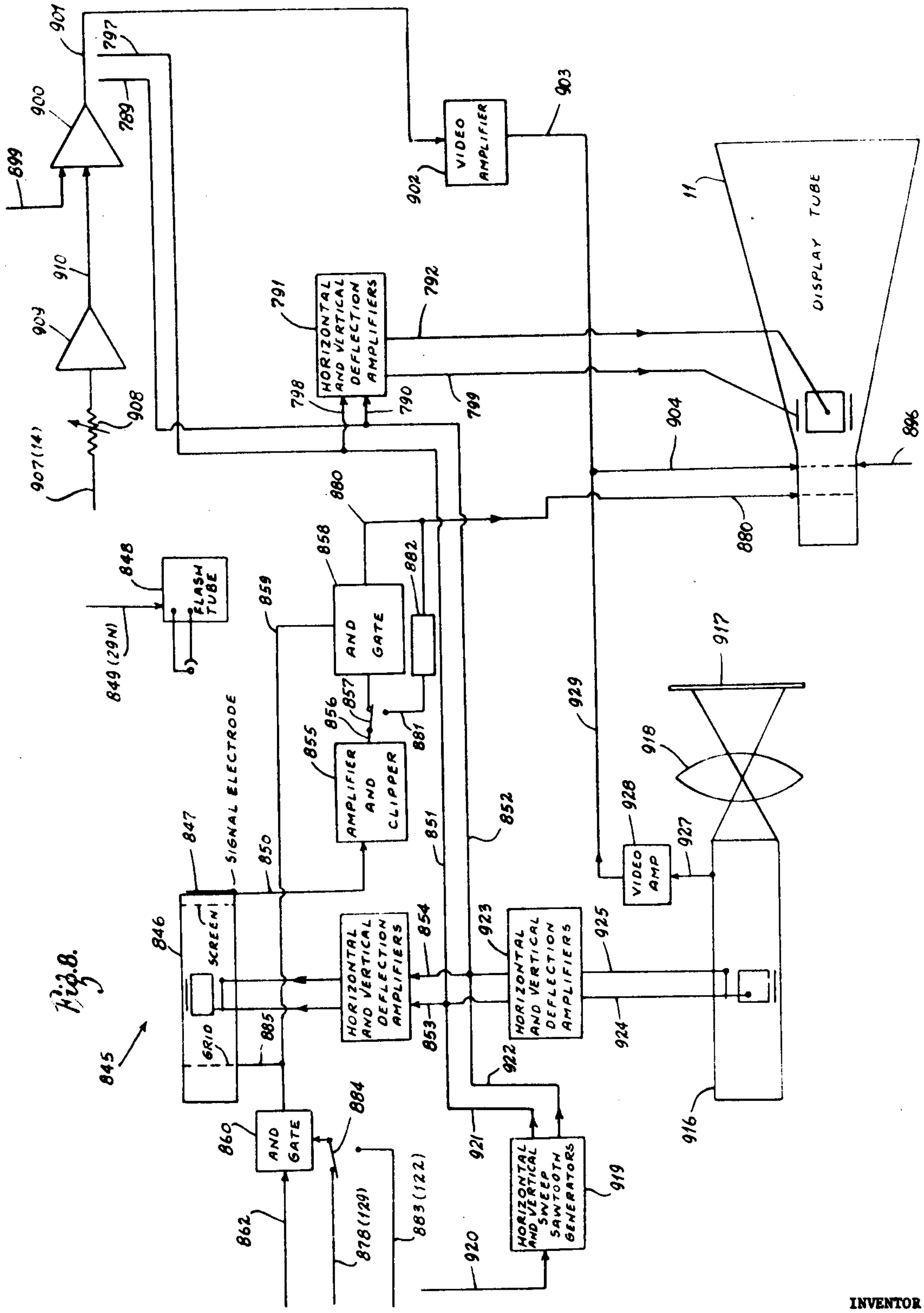


INVENTOR
LEE HARRISON III
BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS

FIG. 7



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BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS



INVENTOR
LEE HARRISON III
BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS

Sept. 8, 1970

L. HARRISON III

3,527,978

FILM PRODUCED BY AUTOMATIC GENERATION AND DISPLAY OF ANIMATED FIGURES

Filed Nov. 16, 1967

12 Sheets-Sheet 9

Fig.9.

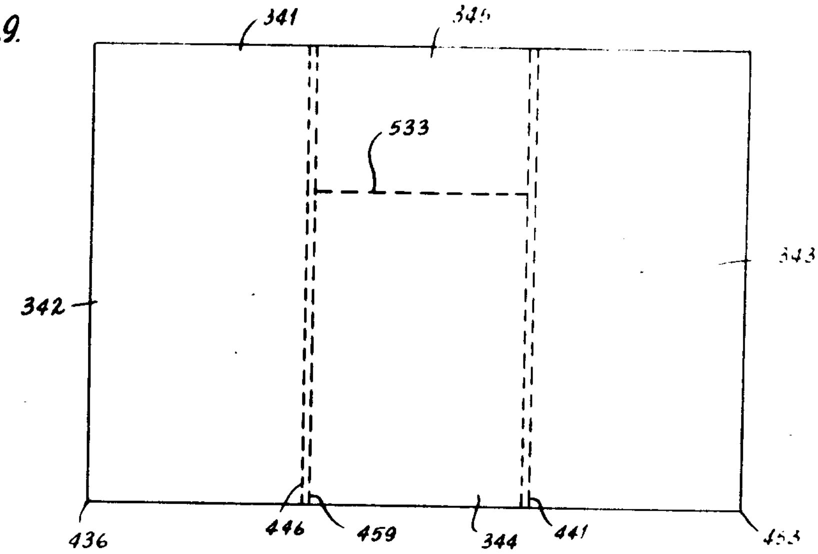
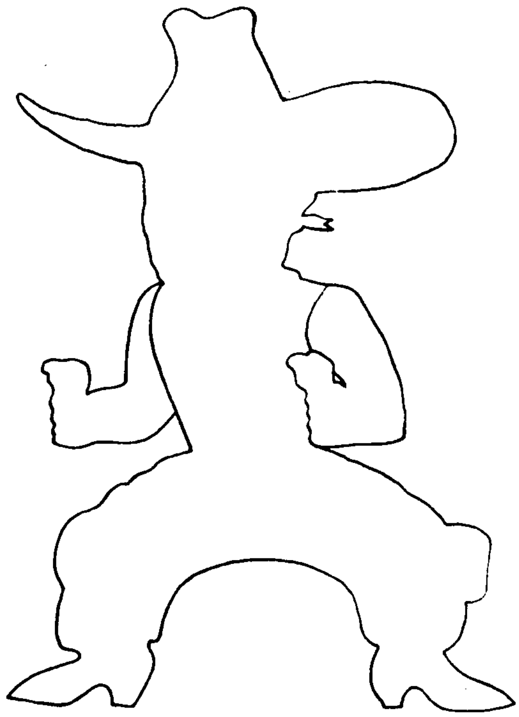


Fig.19.



Fig.20.



INVENTOR
LEE HARRISON III
BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS

Fig.10.

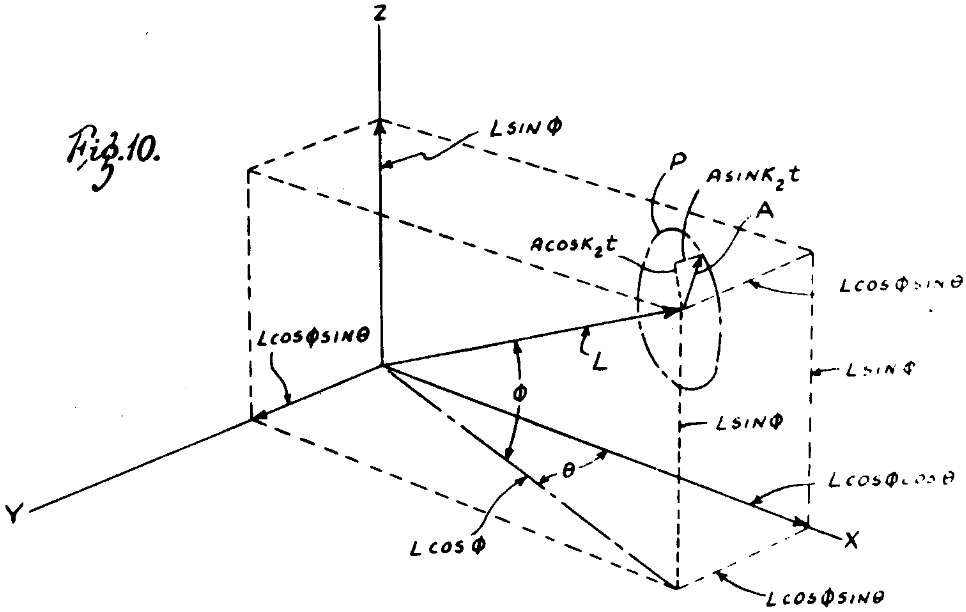


Fig.11.

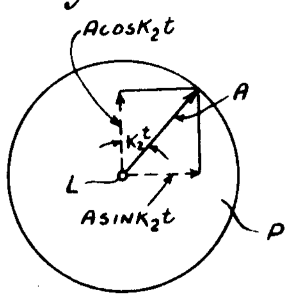


Fig.12.

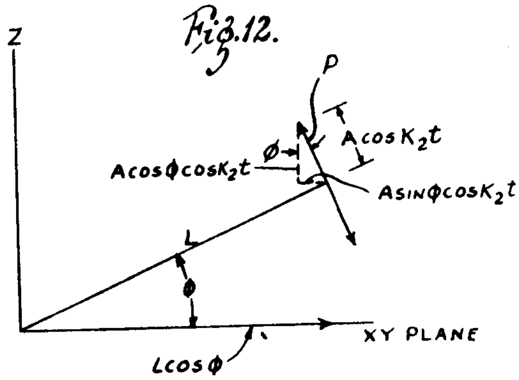


Fig.13.

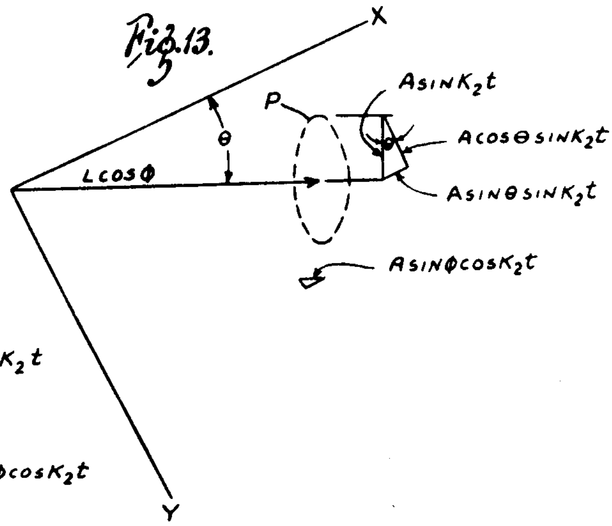
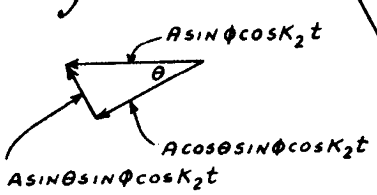


Fig.14.



INVENTOR
LEE HARRISON III
BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS

Fig. 15.

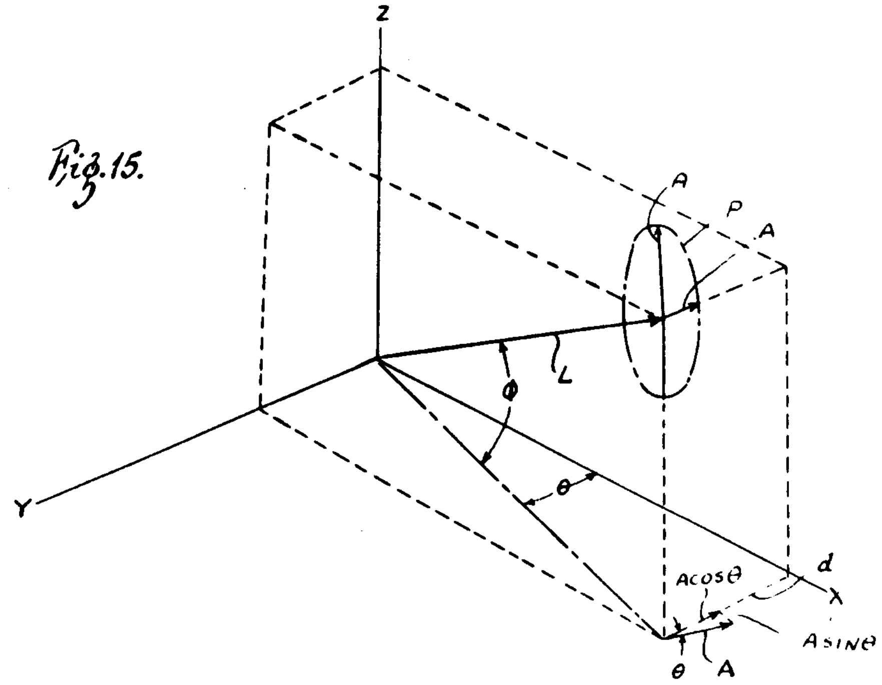


Fig. 16.

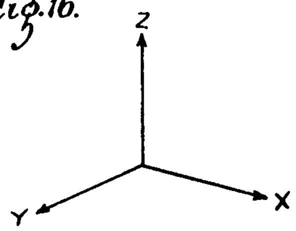


Fig. 17.

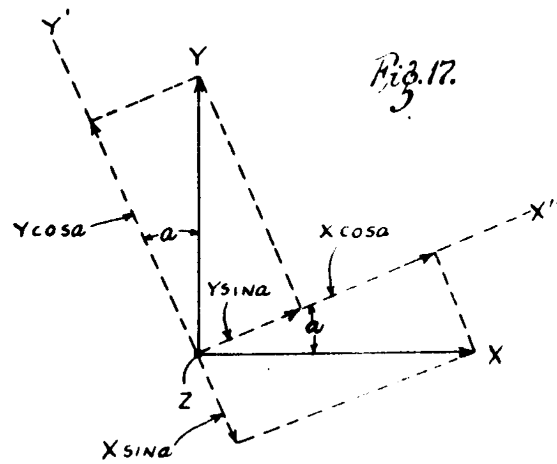
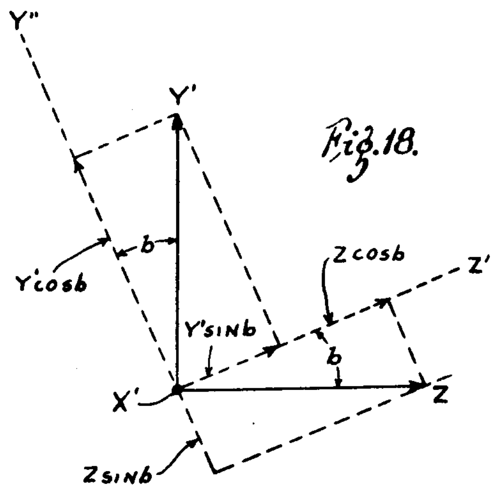


Fig. 18.



INVENTOR
LEE HARRISON III
BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS

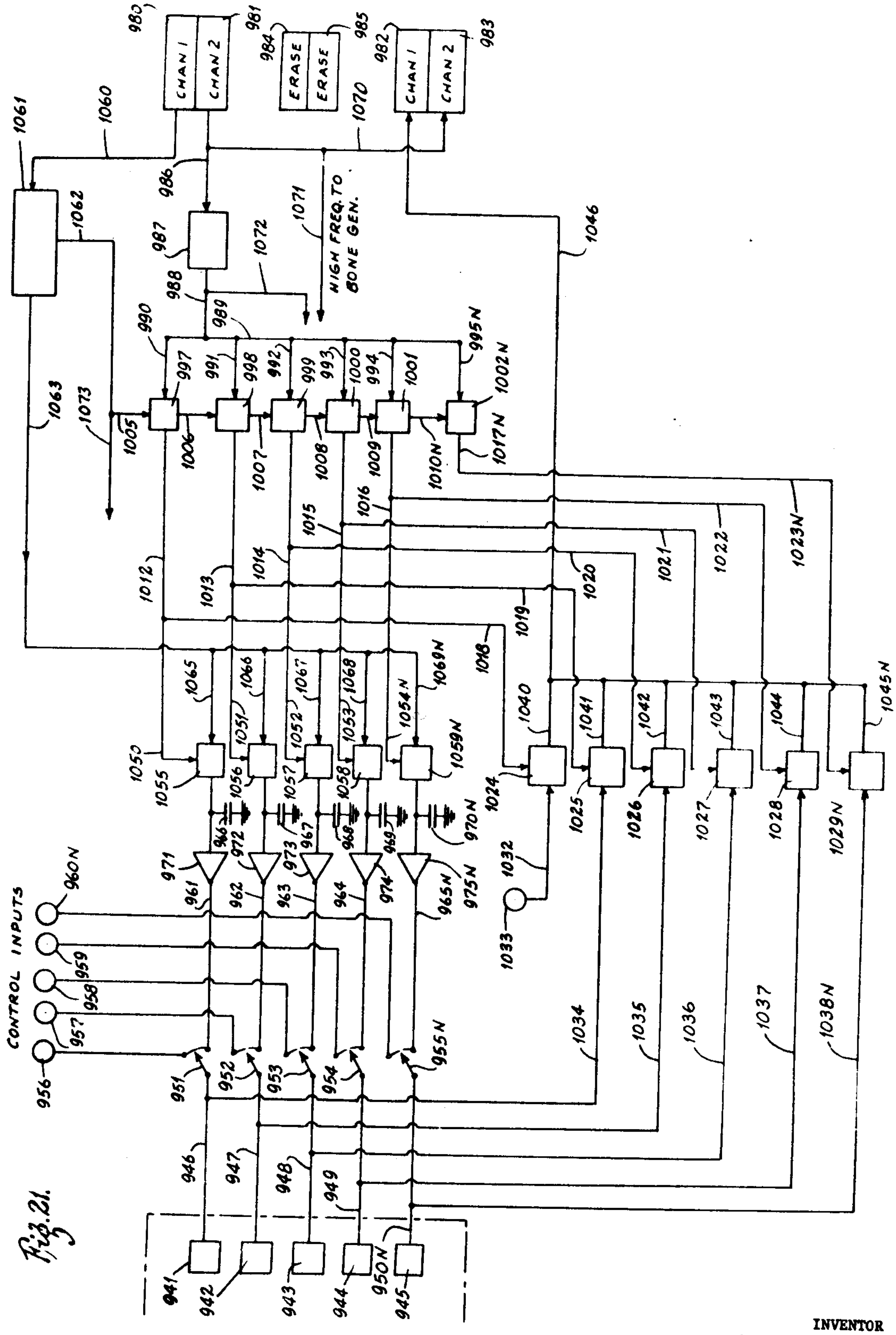


Fig. 21.

INVENTOR
LEE HARRISON III
BY Kingsland, Rogers, Ezell, Eilers & Robbins
ATTORNEYS

United States Patent

[11] 3,585,628

[72] Inventor Lee Harrison, III
Englewood, Colo.
[21] Appl No 834,400
[22] Filed June 18, 1969
Division of Ser. No. 683,702, Nov. 16, 1967, which is a division of Ser. No. 607,078, Jan. 3, 1967, Pat. No. 3,364,382, which is a continuation of Ser. No. 240,970, Nov. 29, 1962, abandoned
[45] Patented June 15, 1971
[73] Assignee Computer Image Corporation
Denver, Colo.

[54] COMPUTER FOR GENERATING ANIMATED IMAGES WITH OVERLAP PREVENTION AND ANIMATION RECORDING

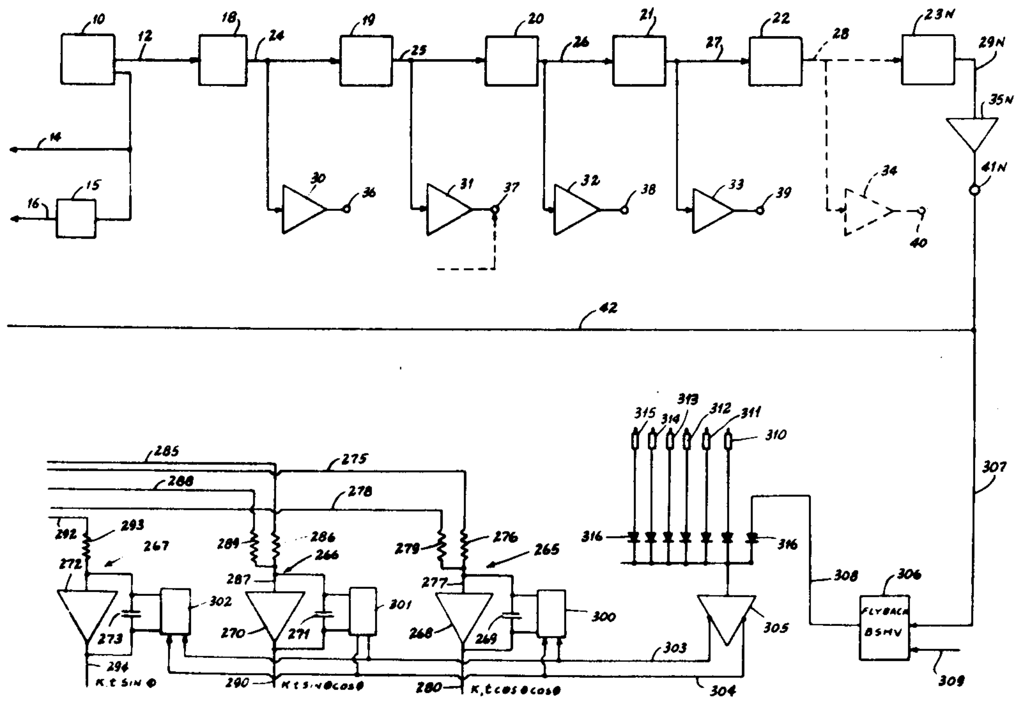
19 Claims, 21 Drawing Figs.

[52] U.S. Cl. 340/324.8, 178/6.8
[51] Int. Cl. G06f 3/14
[50] Field of Search 340/324.1, 170; 178/6.8; 235/185, 186, 189, 198; 315/18

[56] **References Cited**
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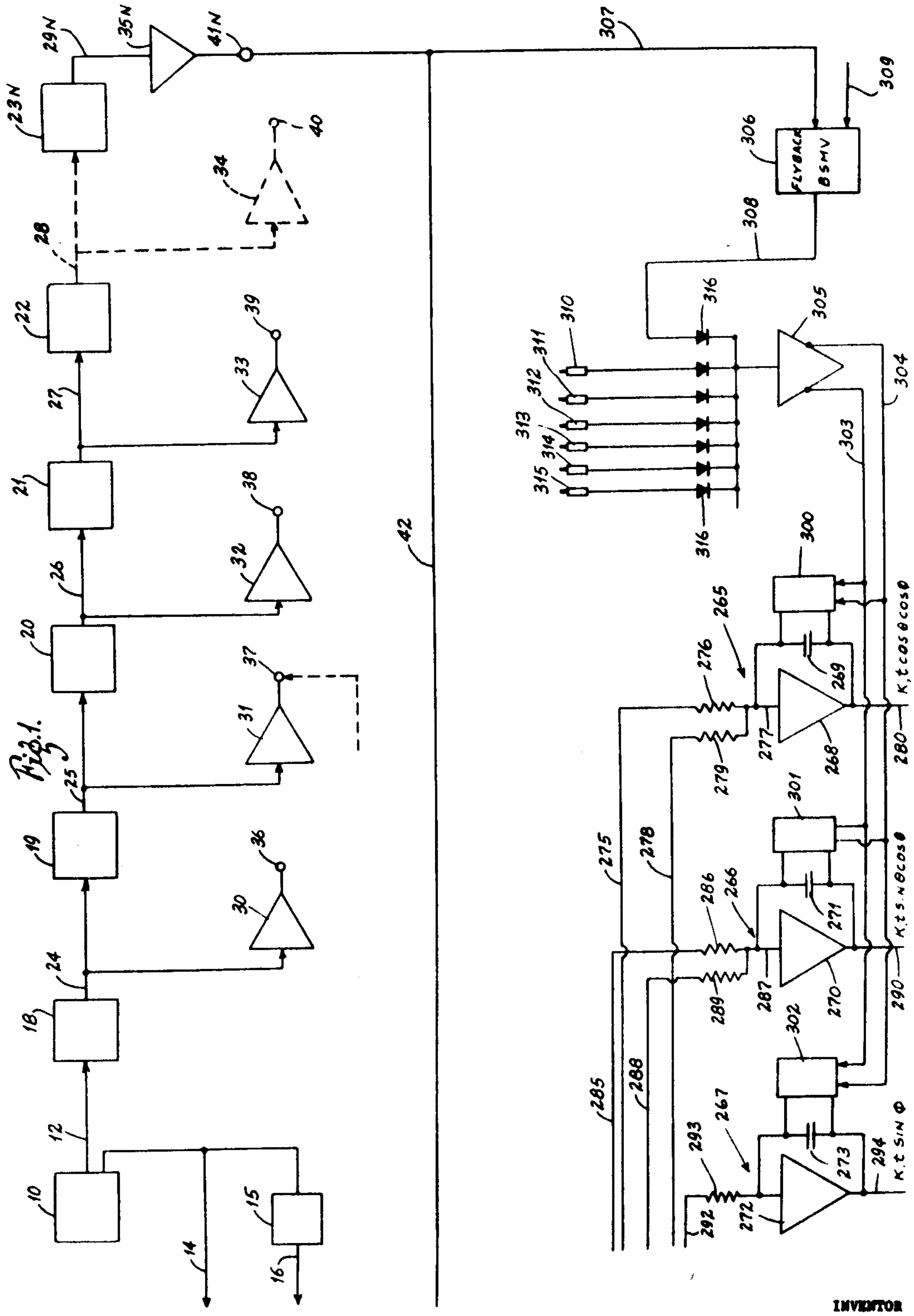
Primary Examiner—John W. Caldwell
Assistant Examiner—Glen R. Swann, III
Attorney—Kingsland, Rogers, Ezell, Eilers & Robbins

ABSTRACT: A system for generating, animating and displaying one or more figures as a series of high frequency displays. The displays are produced by generating a plurality of vectors representing lines of a figure to be displayed. The vectors are located on the display by positioning voltages which uniquely determine the placement of each of the segments of the figure. The system further includes means to generate background information and to prevent the overlapping of foreground and background information. A coordinate transformation network provides resolution of the three-dimensional generated image into a two-dimensional display. Means are also provided for modulating the intensity of selected parts of the displayed image in accordance with shading requirements.



PATENTED JUN 15 1971 3,585,628

SHEET 01 OF 12



INVENTOR
LEE HARRISON III

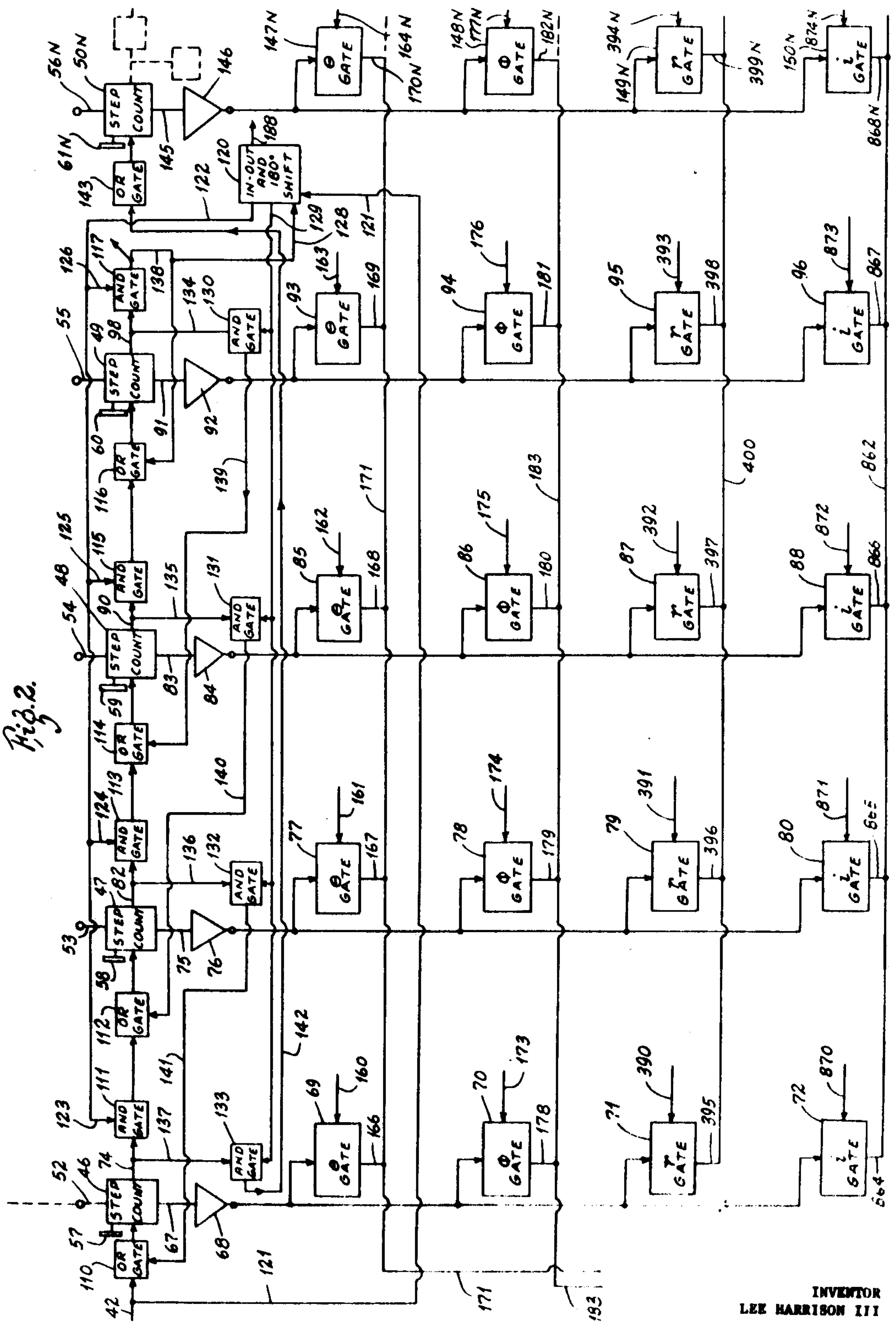
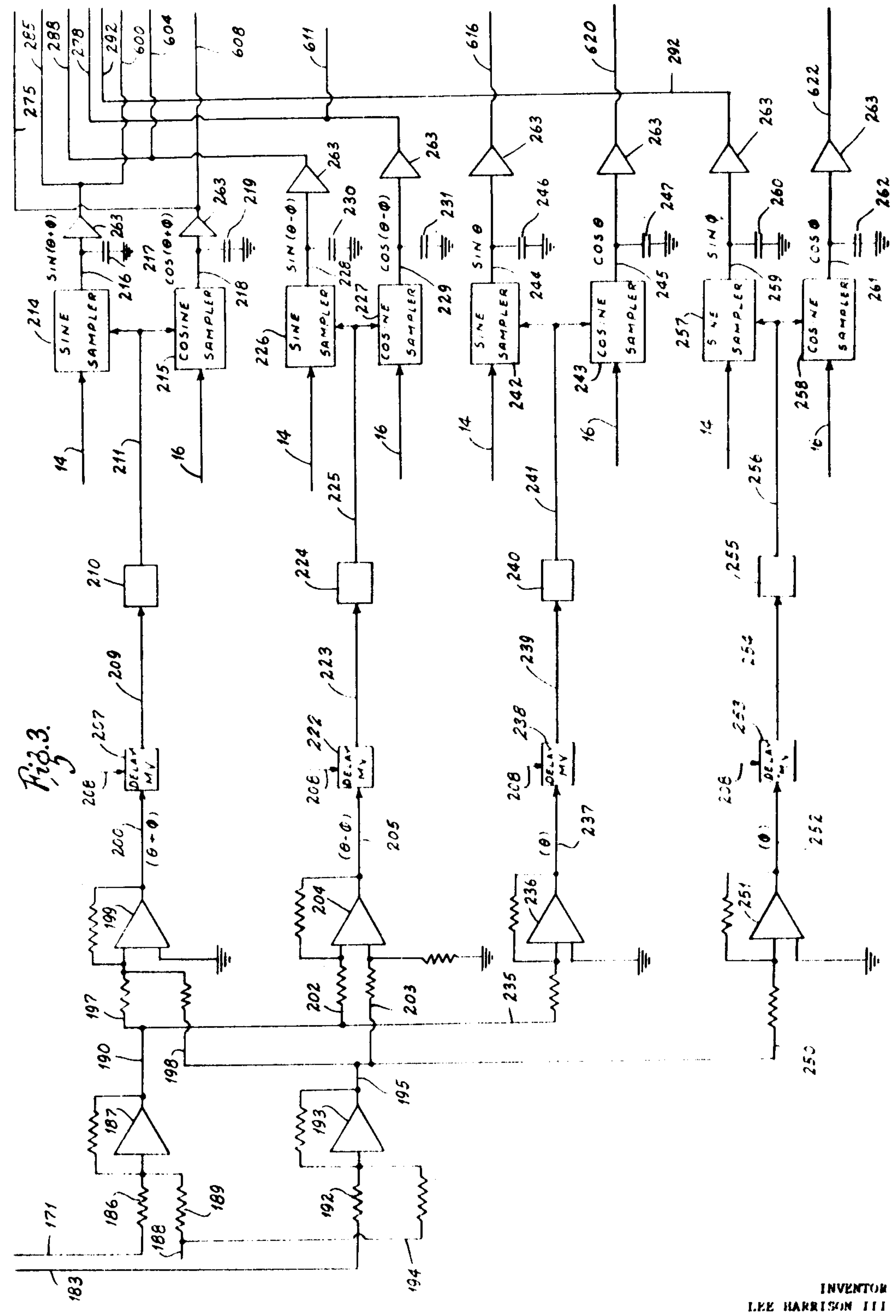
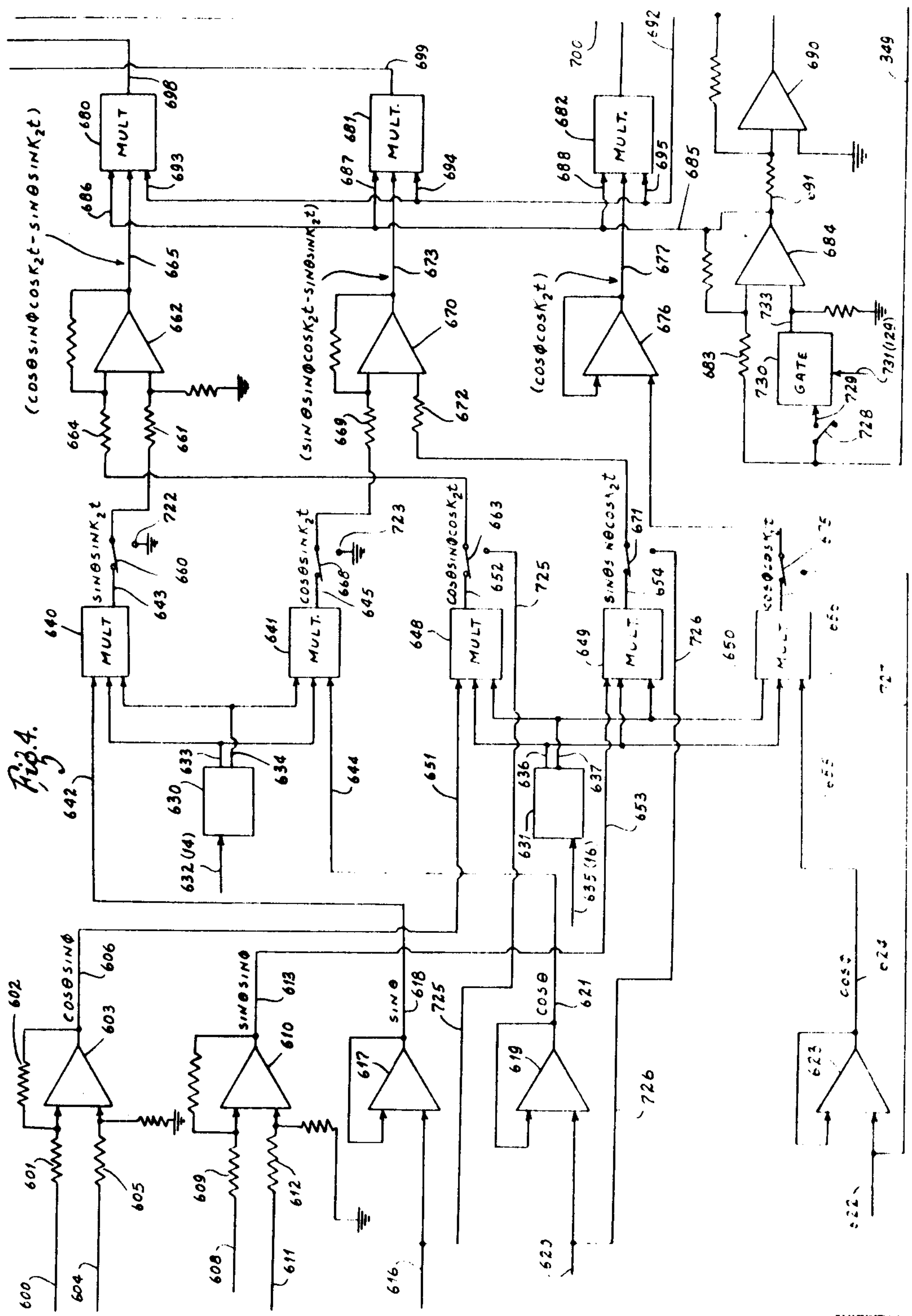


Fig. 2.

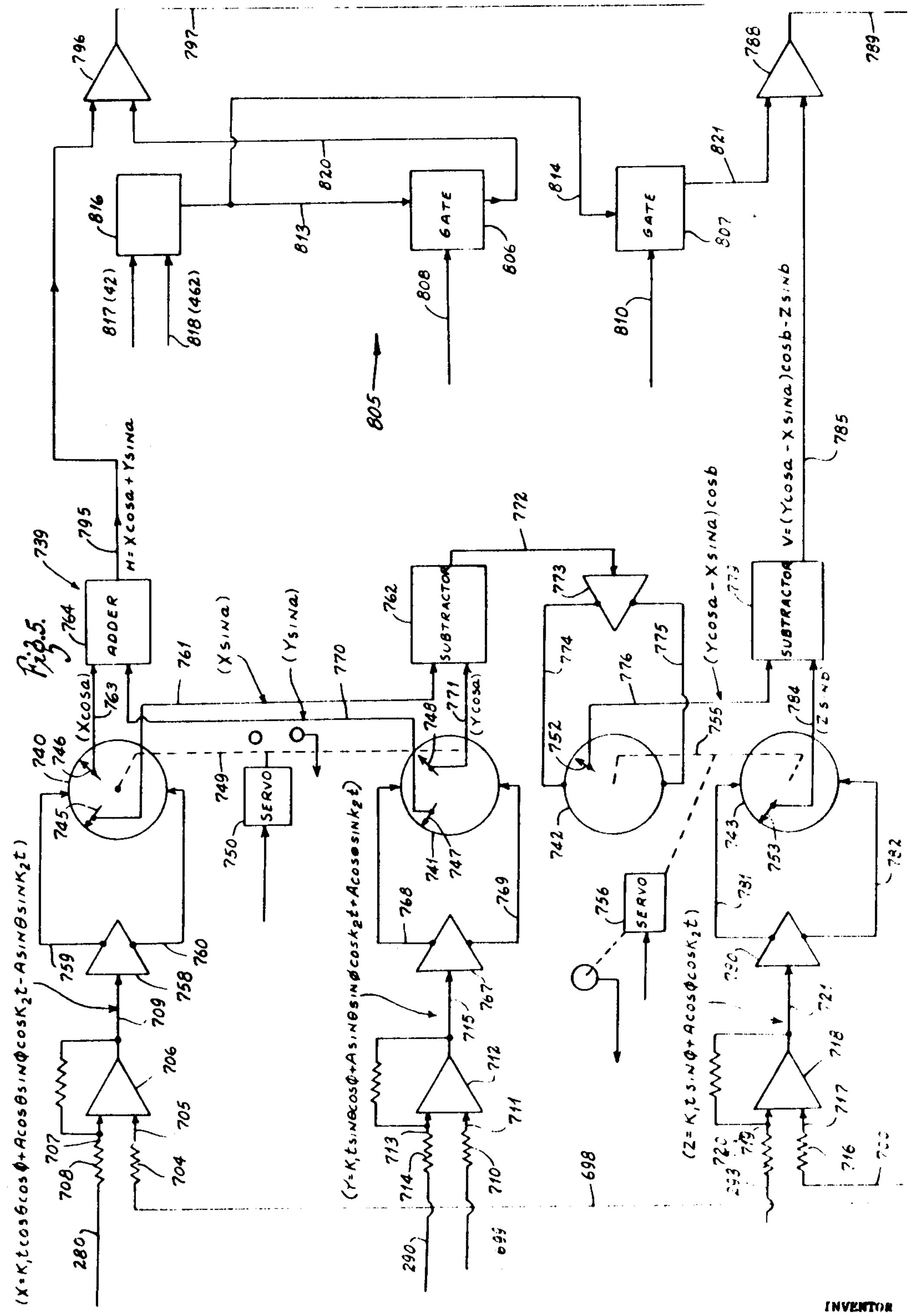
INVENTOR
LEE HARRISON III



INVENTOR
LEE HARRISON III

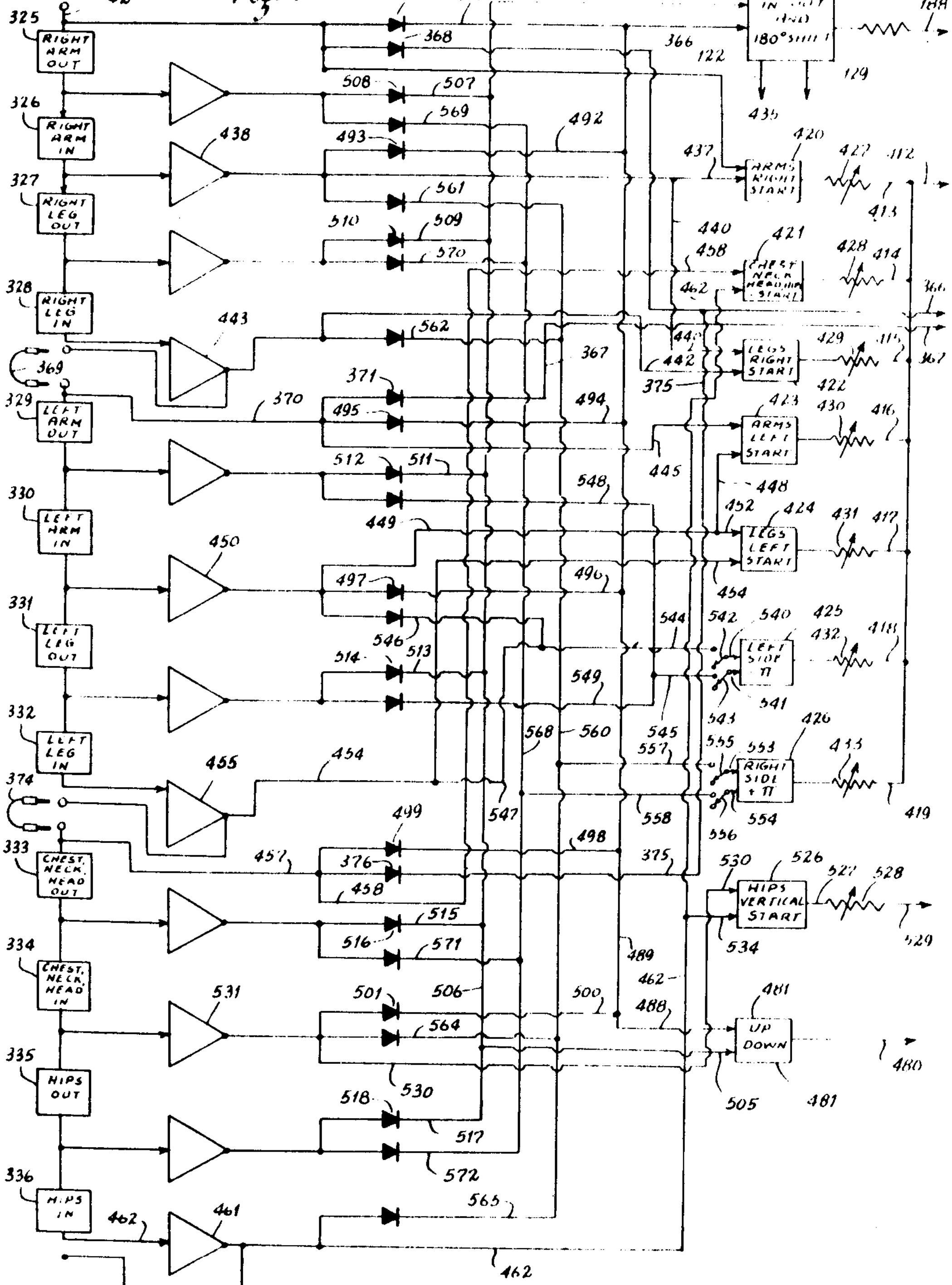


INVENTOR
LEE HARRISON III

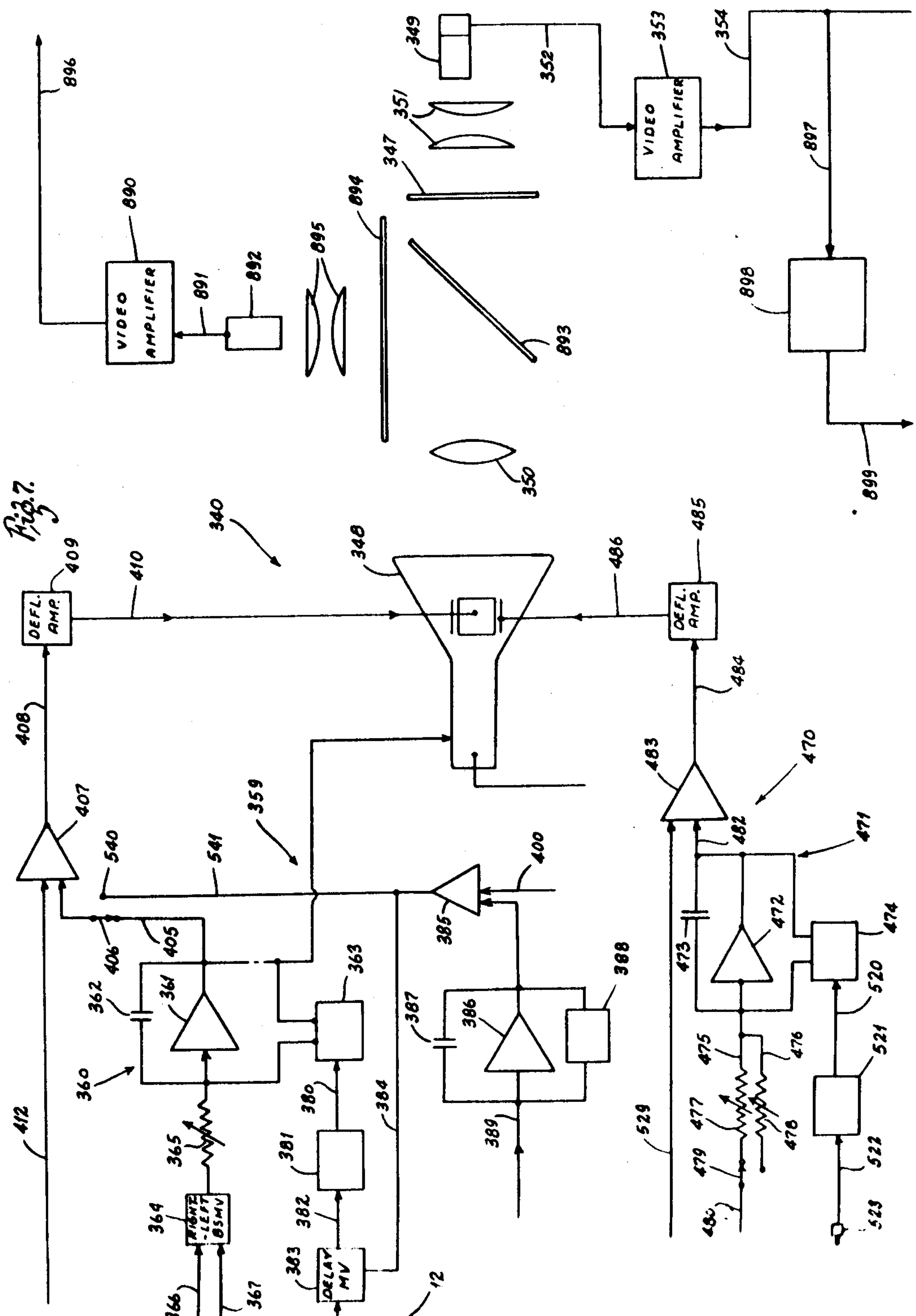


INVENTOR
LEE HARRISON III

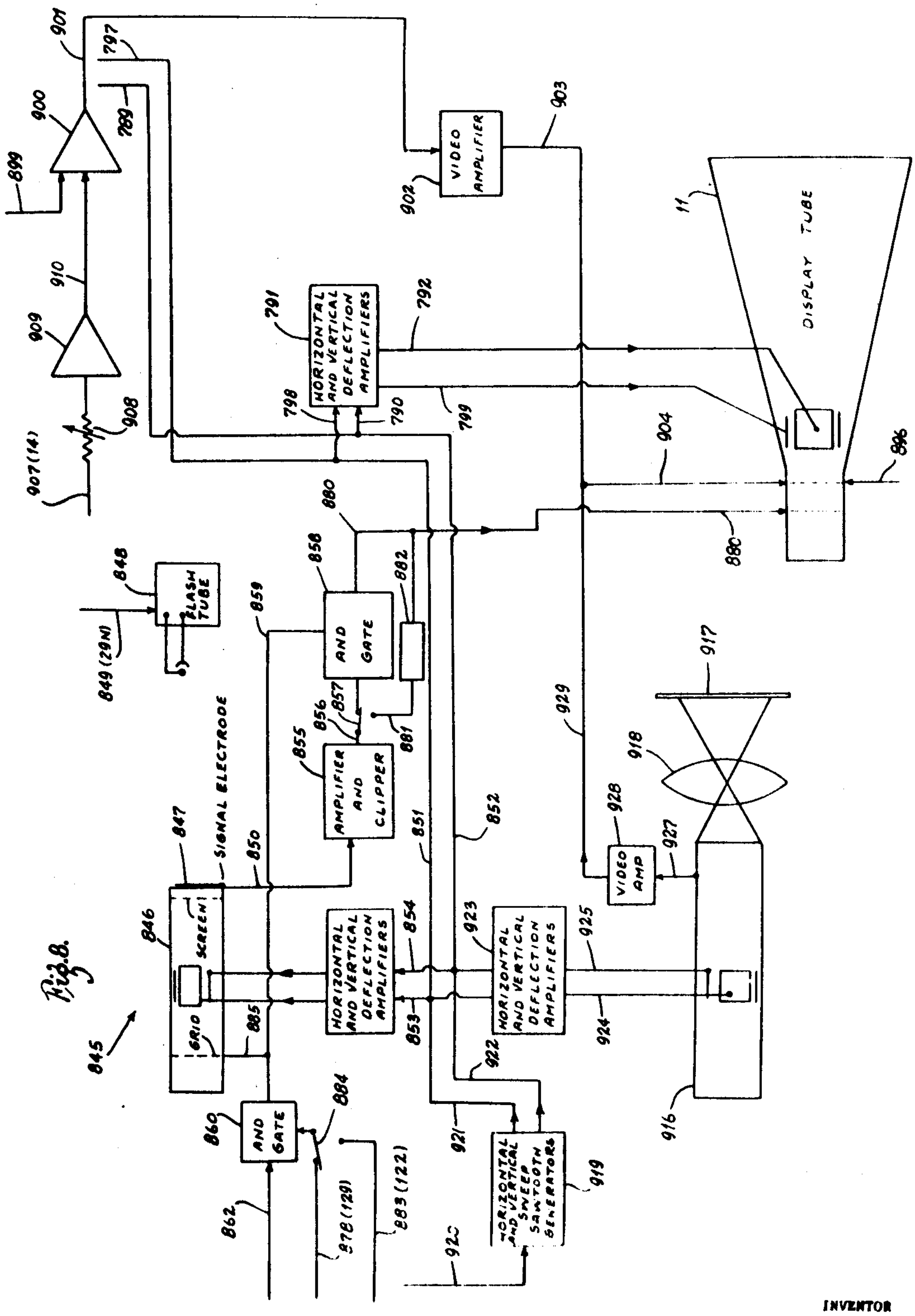
Fig. 6.



INVENTOR
LEE HARRISON III



INVENTOR
LEE HARRISON III



INVENTOR
LEE HARRISON III

Fig.9.

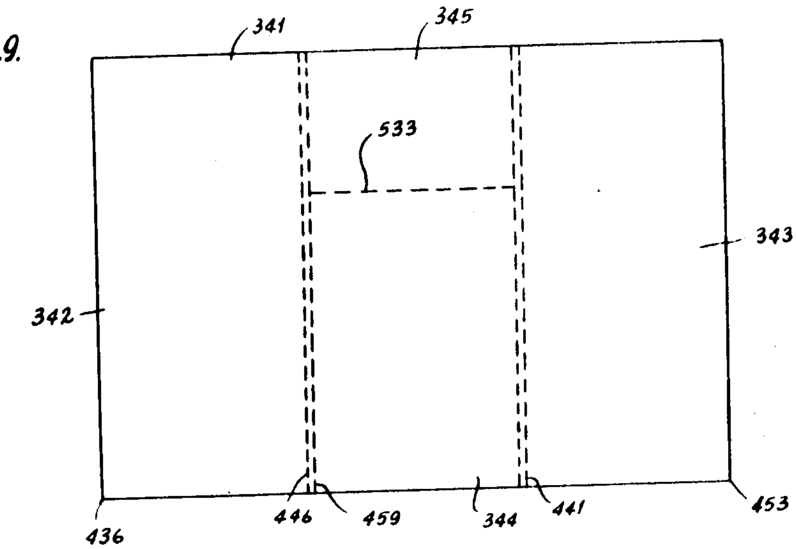
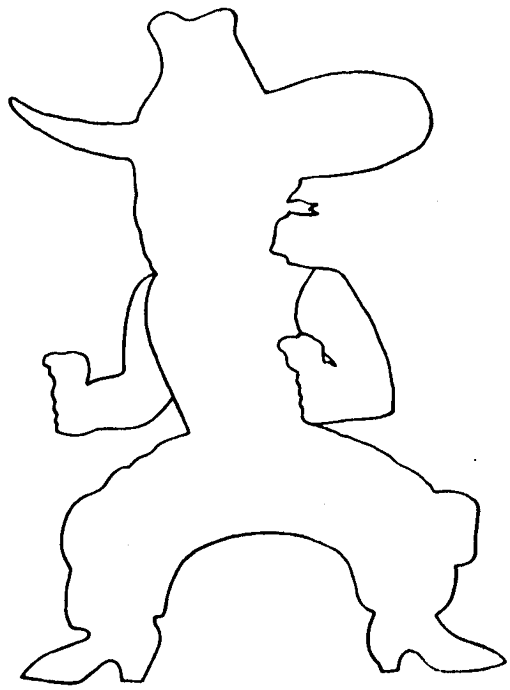


Fig.19.



Fig.20.



INVENTOR
LEE HARRISON III

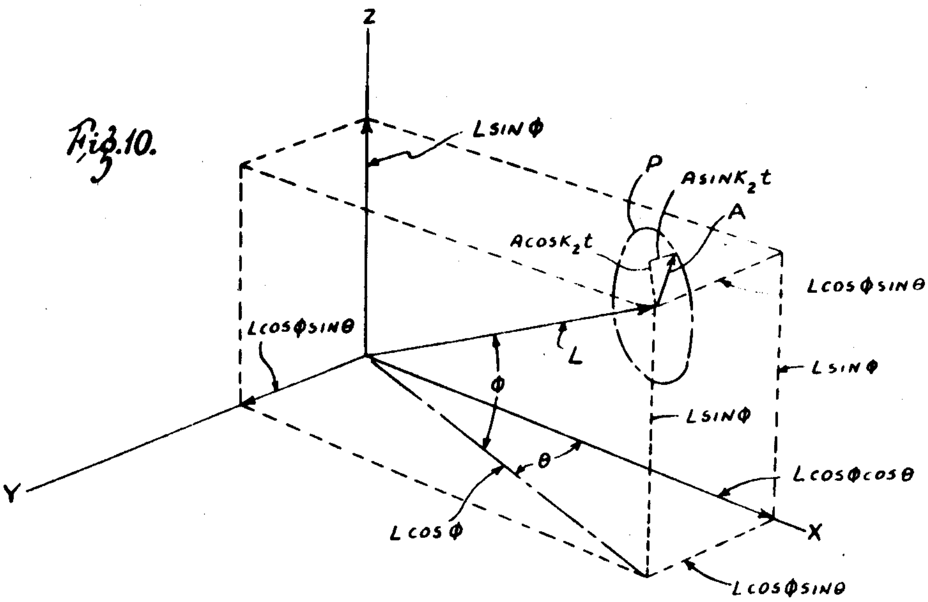


Fig. 10.

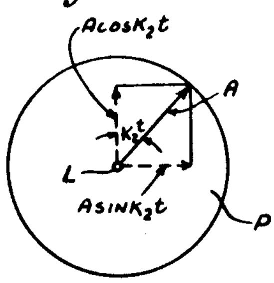


Fig. 11.

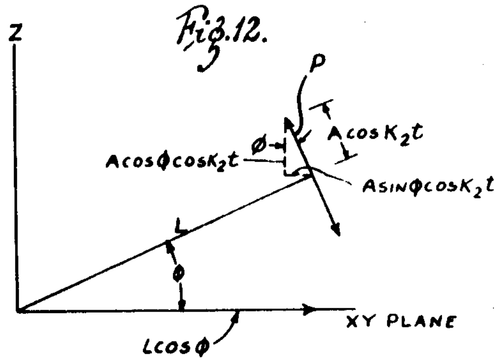


Fig. 12.

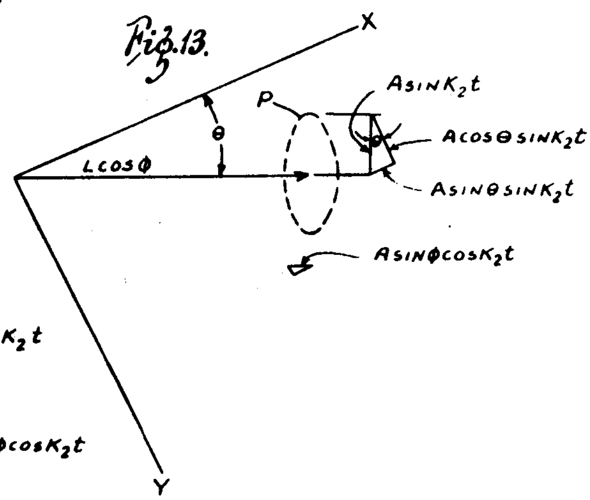


Fig. 13.

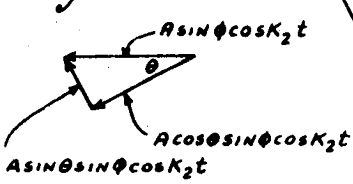


Fig. 14.

INVENTOR
LEE HARRISON III

Fig.15.

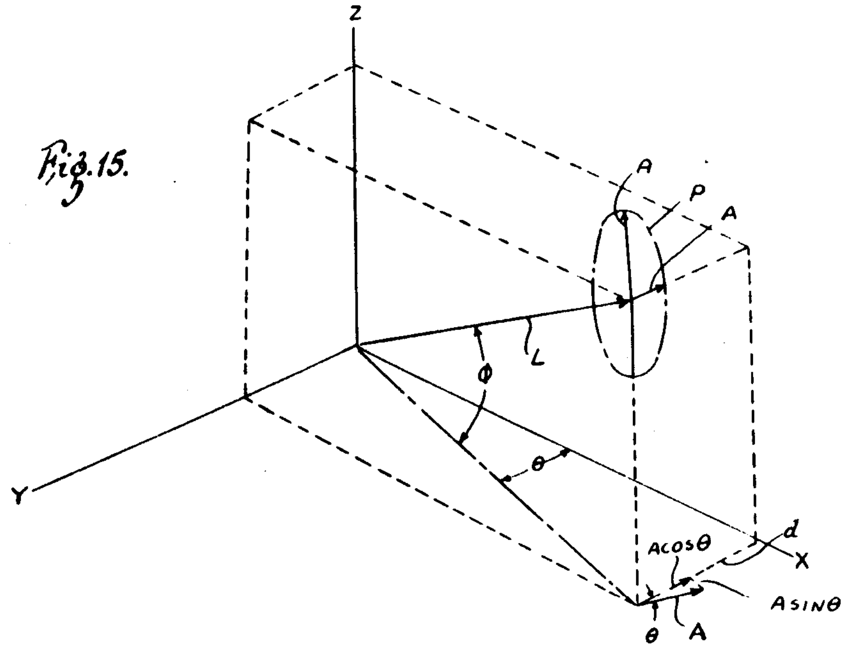


Fig.16.

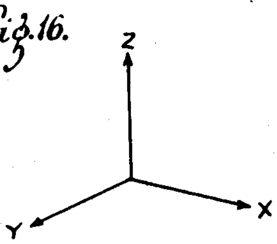


Fig.17.

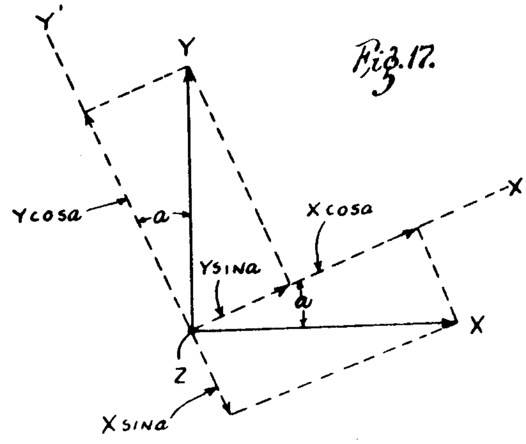
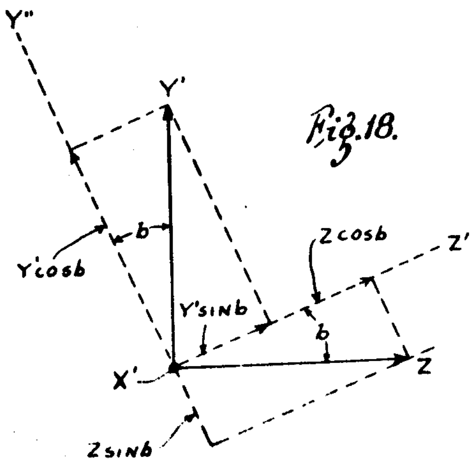


Fig.18.



INVENTOR
LEE HARRISON III

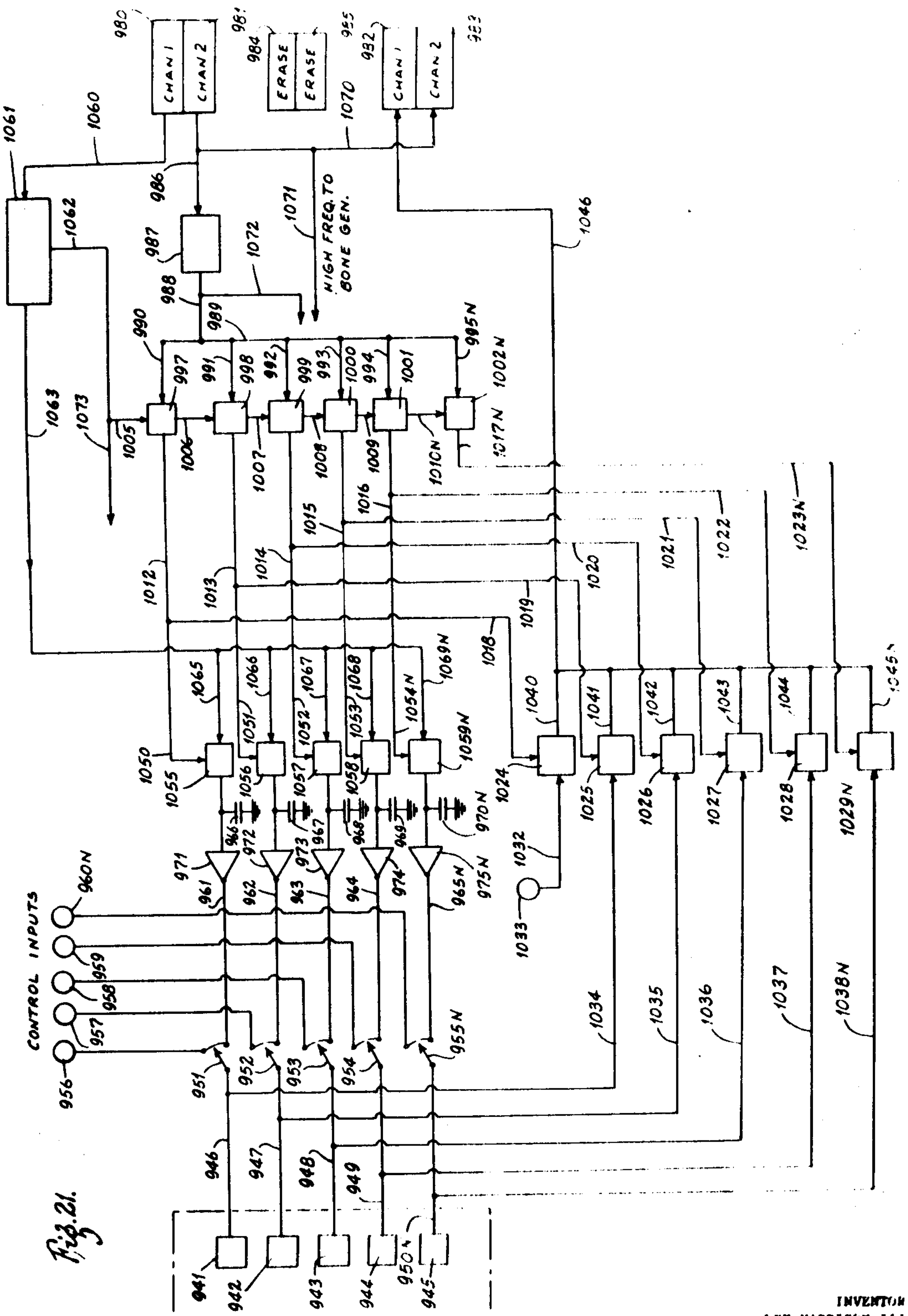


Fig. 21.

INVENTOR
LEE HARRISON III

(10)

United States Patent

[11] 3,603,964

[72] Inventor Lee Harrison, III
Englewood, Colo.

[21] Appl. No. 697,512
[22] Filed Jan. 12, 1968
Continuation-in-part of Ser. No. 607,078, Jan. 3, 1967, Pat. No. 3,364,382, which is a Continuation of Ser. No. 240,970, Nov. 29, 1962, abandoned.
[45] Patented Sept. 7, 1971
[73] Assignee Computer Image Corporation
Denver, Colo.

[54] MEANS AND METHOD FOR SEMI-AUTOMATICALLY SEQUENCING THE GENERATION OF COMPONENTS FOR AN ELECTRONIC IMAGE DISPLAY
10 Claims, 3 Drawing Figs.

[52] U.S. Cl. .... 340/324 A, 178/75 D
[51] Int. Cl. G06f 3/14
[50] Field of Search .... 340/324.1; 235/150.53, 151; 35/10.4; 178/7.5 D

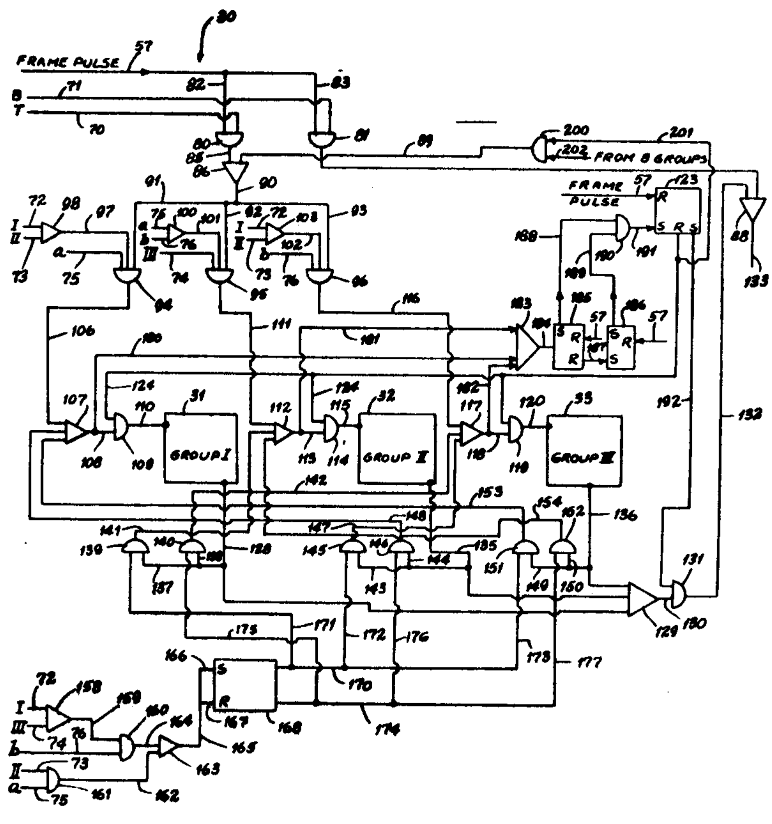
[56] References Cited

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3,110,802	11/1963	Ingham et al.	340/324.1
3,309,659	3/1967	Balding	35/10.4
3,333,260	7/1967	Olson	340/324.1
3,335,315	8/1967	Moore	340/324.1

Primary Examiner—John W. Caldwell
Assistant Examiner—Marshall M. Curtis
Attorney—Kingsland, Rogers, Ezell, Eilers & Robbins

ABSTRACT: A network for sequencing the generation of parts for the display of an electronically generated image using signals established and controlled according to the viewing angle of the display subject. For sequencing purposes, parts of the display are assigned to sets of three groups connected in a closed loop. Depending upon the angle of viewing the display subject, selective transmission of enabling signals determines which group will start the sequence and in which order the other two groups will follow.



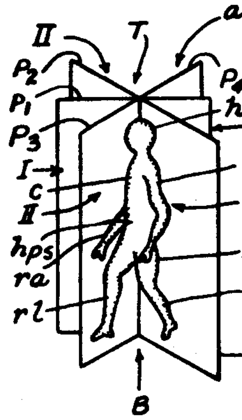


Fig. 1.

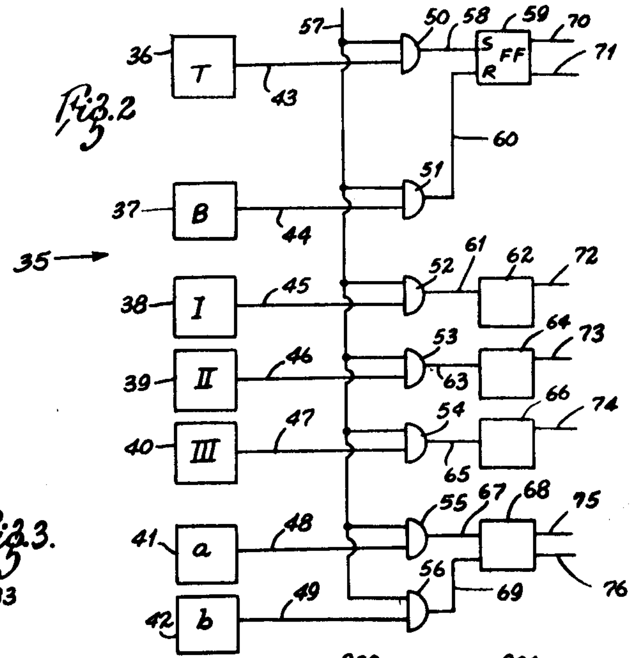


Fig. 2

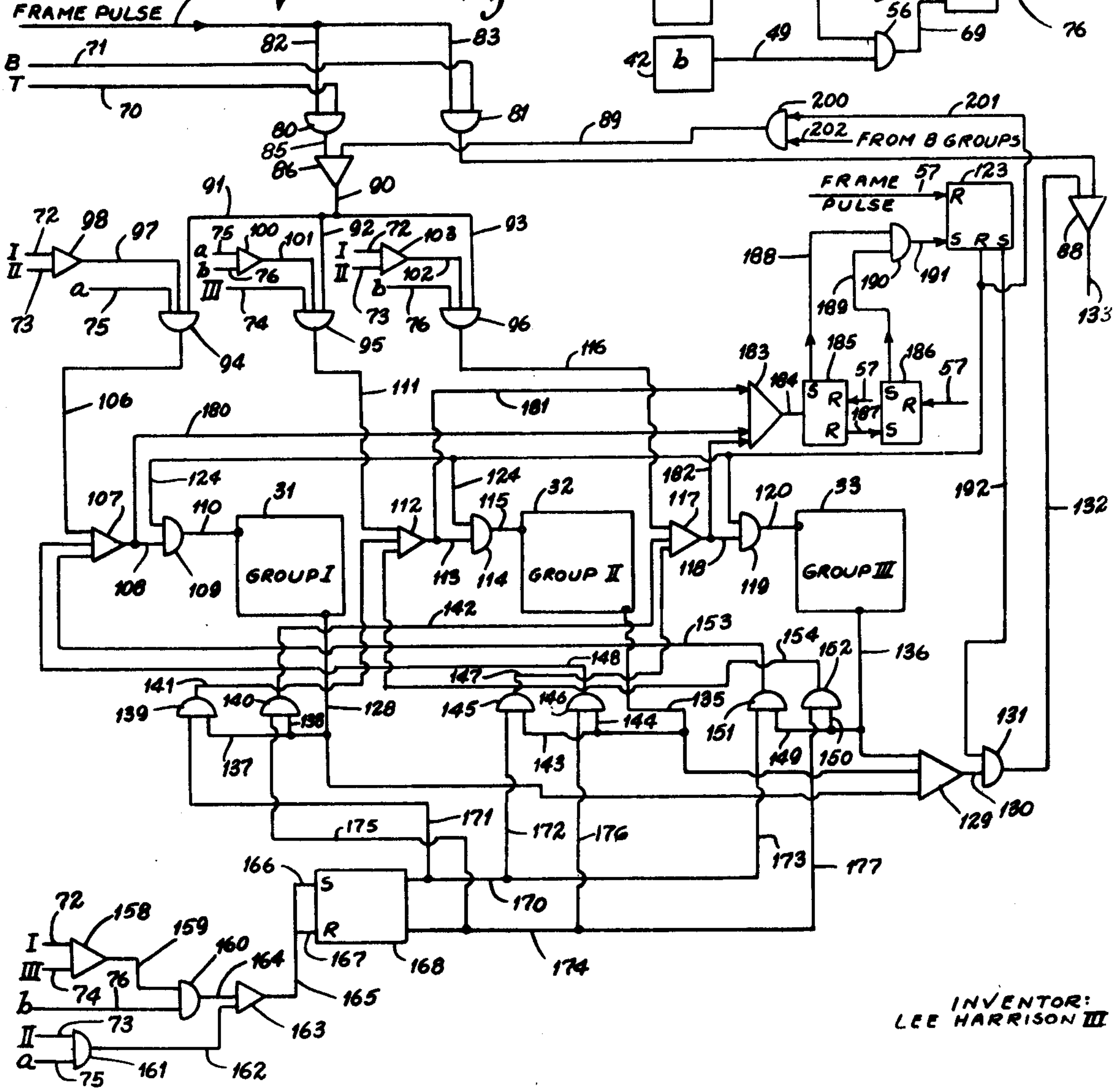


Fig. 3.

INVENTOR:
LEE HARRISON III

United States Patent [15] 3,662,374
Harrison, III et al. [45] May 9, 1972

[54] AUTOMATIC GENERATION OF A MOUTH DISPLAY AND ANIMATION OF THE MOUTH IN RESPONSE TO SOUND

[72] Inventors: **Lee Harrison, III**, Camarillo, Calif.; **Francis J. Honey; Edwin J. Tajchman**, both of Denver, Colo.; **Lloyd W. Bowles**, Lakewood, Colo.

[73] Assignee: **Computer Image Corporation**, Denver, Colo.

[22] Filed: **July 13, 1970**

[21] Appl. No.: **54,305**

[52] **U.S. Cl.** ....**340/324 A,** 179/1 AS, 179/1 VS, 352/5, 352/15, 352/16

[51] **Int. Cl.** **G06f 3/14**

[58] **Field of Search**..................340/324 A; 352/5, 8, 15, 16; 315/18, 26; 84/464; 179/1 AS, 1 VS

[56] **References Cited**

UNITED STATES PATENTS

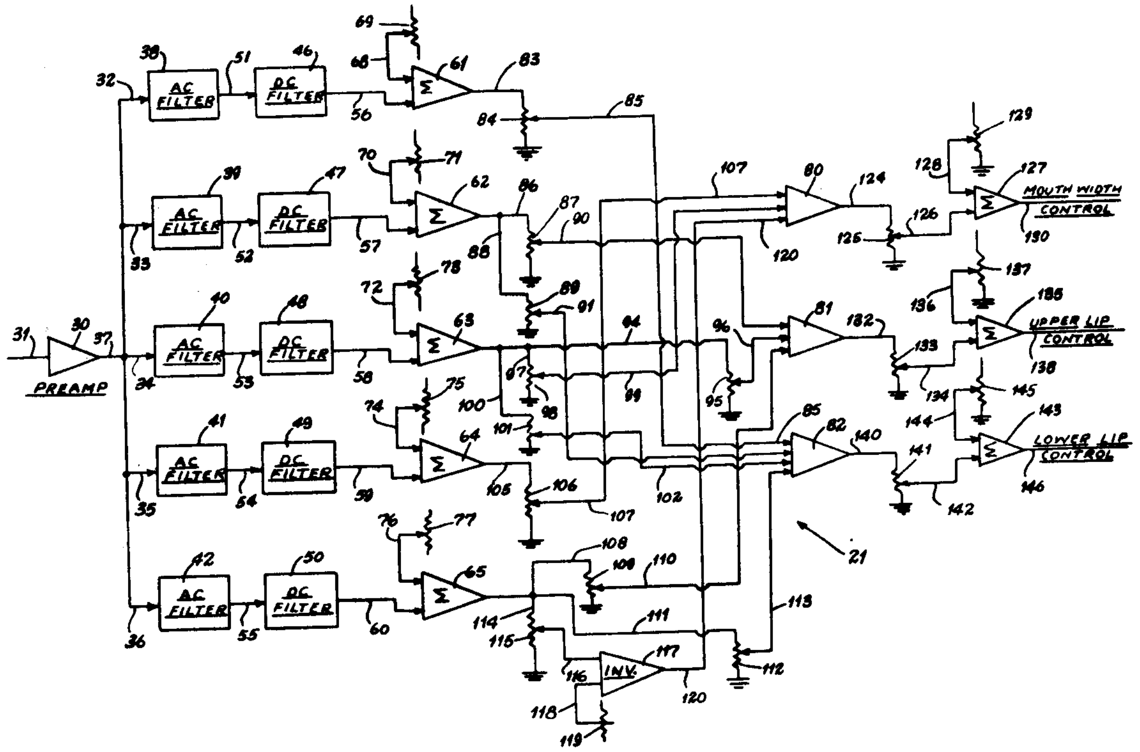
3,140,347 7/1964 Cohen 84/464
3,440,349 4/1969 Gibbs....................................179/1 VS
3,360,724 12/1967 Guros et al............................179/1 AS
3,546,584 12/1970 Scarr....................................179/1 AS
3,038,061 6/1962 O'Reilly....................................84/464
2,804,500 8/1957 Giacoletto ....179/1 VS

Primary Examiner—John W. Caldwell
Assistant Examiner—Marshall M. Curtis
Attorney—Rogers, Ezell, Eilers & Robbins

[57] **ABSTRACT**

Automatic synchronization of movement of a computer generated mouth to movement of a real mouth uttering words. Establishing signals to define the basic form of the mouth generated by the computer for display on a display tube. Combining high frequency sine and cosine signals with the basic form signals to form the body of the mouth on the display tube with modulation of the high frequency signals for shaping the lips. Utilizing pattern recognition and filtering signals of different frequencies that correspond to different spoken sounds. Combining the filtered signals to create control voltages representative of the realistic or alternatively, intentionally impressionistic motions of the mouth corresponding to the spoken sound. Using the control voltages to control movement of the beam of the display tube to effect the amplitude of movement of the upper lip, the amplitude of movement of the lower lip, and the width of the mouth generated by the computer. Controlling the intensity of the beam as the mouth is drawn and animated.

17 Claims, 9 Drawing Figures



(12)

United States Patent

Altemus

[15] **3,688,028**

[45] **Aug. 29, 1972**

[54] **BEAM INTENSITY COMPENSATOR**

[72] Inventor: **William C. Altemus**, Littleton, Colo.

[73] Assignee: **Computer Image Corporation**, Denver, Colo.

[22] Filed: **Sept. 23, 1970**

[21] Appl. No.: **74,662**

[52] U.S. Cl. ....178/6.8, 178/DIG. 29, 178/7.5 D, 178/7.5 SE, 340/324 A

[51] Int. Cl. H04n 5/19, H04n 5/58

[58] Field of Search ....178/7.7, 6.8, DIG. 29, 17.3 R, 178/7.3 D, 7.5 D, 7.5 SE; 340/324 A

[56] **References Cited**

UNITED STATES PATENTS

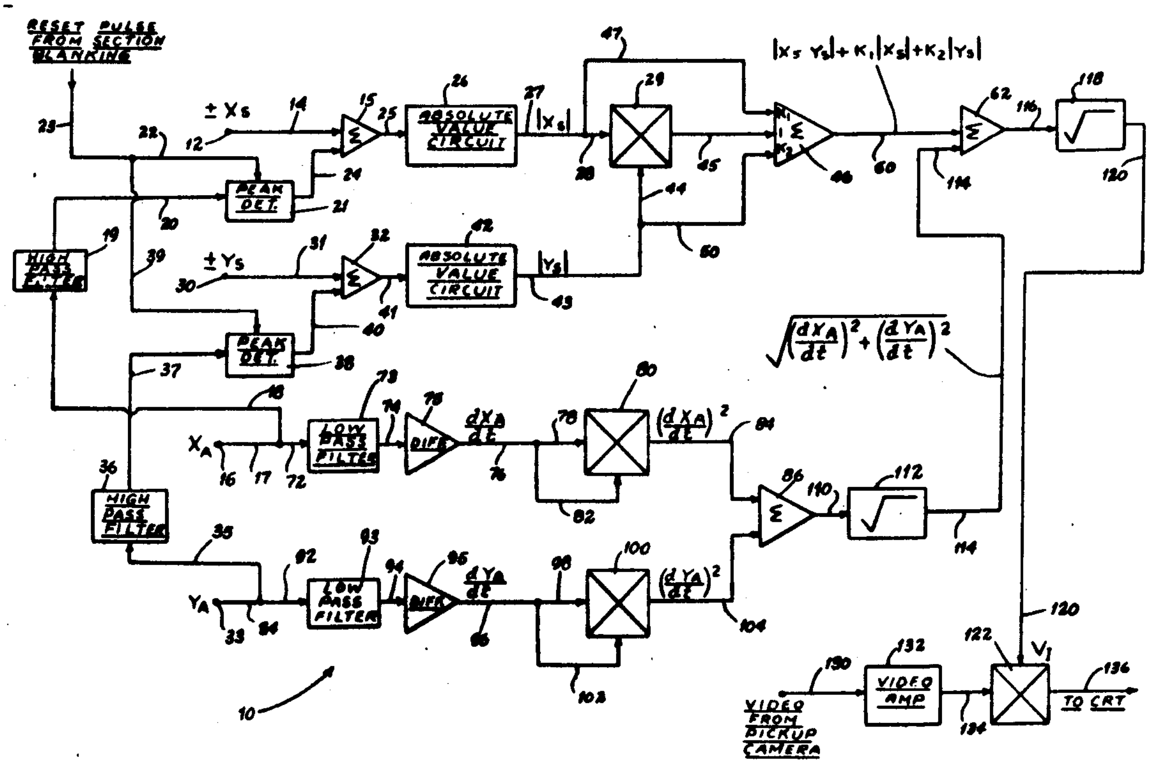
3,333,147	7/1967	Henderson	315/22
2,510,670	6/1950	Trott	178/7.5 R
3,325,803	6/1967	Carlock et al.	315/18
3,335,315	8/1967	Moore	315/18

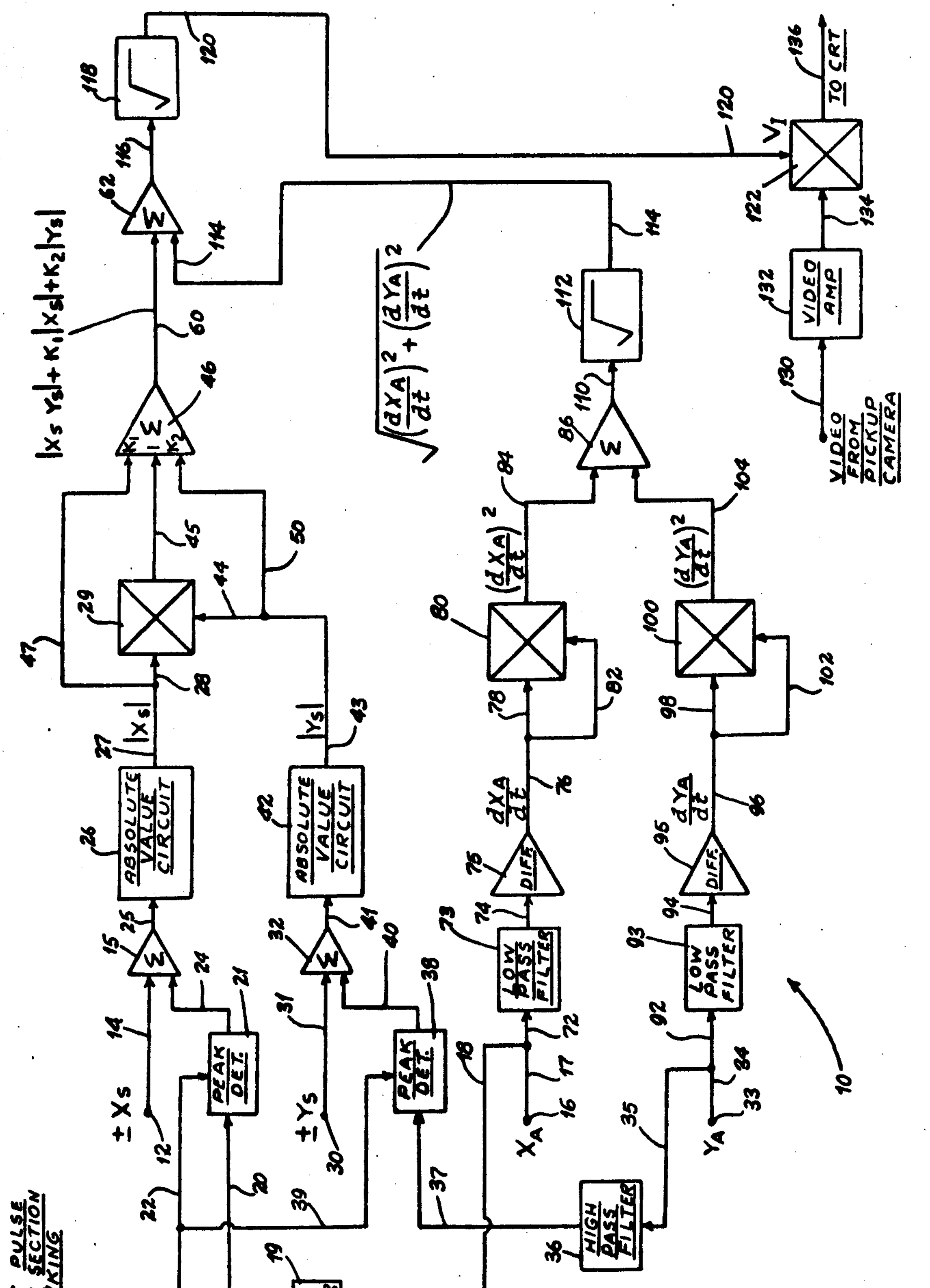
Primary Examiner—Robert L. Griffin
Assistant Examiner—Richard K. Eckert, Jr.
Attorney—Rogers, Ezell, Eilers & Robbins

[57] **ABSTRACT**

A system for automatically controlling the beam intensity of a display cathode ray tube to generate an image of constant brightness despite variances in the size of the image or scanning velocity of the spot produced by the electron beam, including means for generating a beam intensity control voltage comprised of signals which are functions of the size of the image and/or the scan velocity of the spot.

30 Claims, 1 Drawing Figure





INVENTOR:
WILLIAM C. ALTEMUS
BY Rogers, Ezell, Eilers & Robbins
ATTORNEYS

United States Patent

Honey et al.

[15] **3,689,917**

[45] **Sept. 5, 1972**

[54] **FREQUENCY SELECTOR AND SYNTHESIZER**

[72] Inventors: **Francis J. Honey; Frank D. Wells,** both of Denver, Colo.

[73] Assignee: **Computer Image Corporation,** Denver, Colo.

[22] Filed: **Sept. 16, 1970**

[21] Appl. No.: **72,642**

[52] U.S. Cl. ....**340/324 A,** 235/198

[51] **Int. Cl.** **G06f 3/14**

[58] **Field of Search** .....340/324 A; 315/18; 235/197, 235/198

[56] **References Cited**

UNITED STATES PATENTS

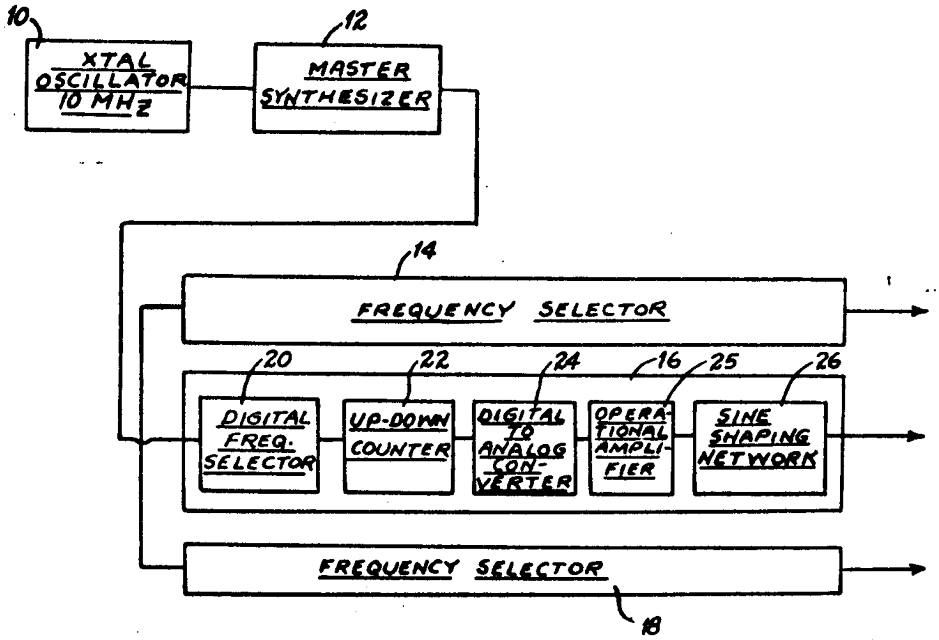
3,510,865	5/1970	Callahan et al.	340/324 A
3,483,547	12/1969	Henderson	340/324 A
3,587,083	6/1971	Tubinis	340/324 A

Primary Examiner—John W. Caldwell
Assistant Examiner—Marshall M. Curtis
Attorney—Rogers, Ezell, Eilers & Robbins

[57] **ABSTRACT**

A system for synthesizing a plurality of mutually coherent electrical signals with means for selecting the frequency of each signal.

44 Claims, 8 Drawing Figures



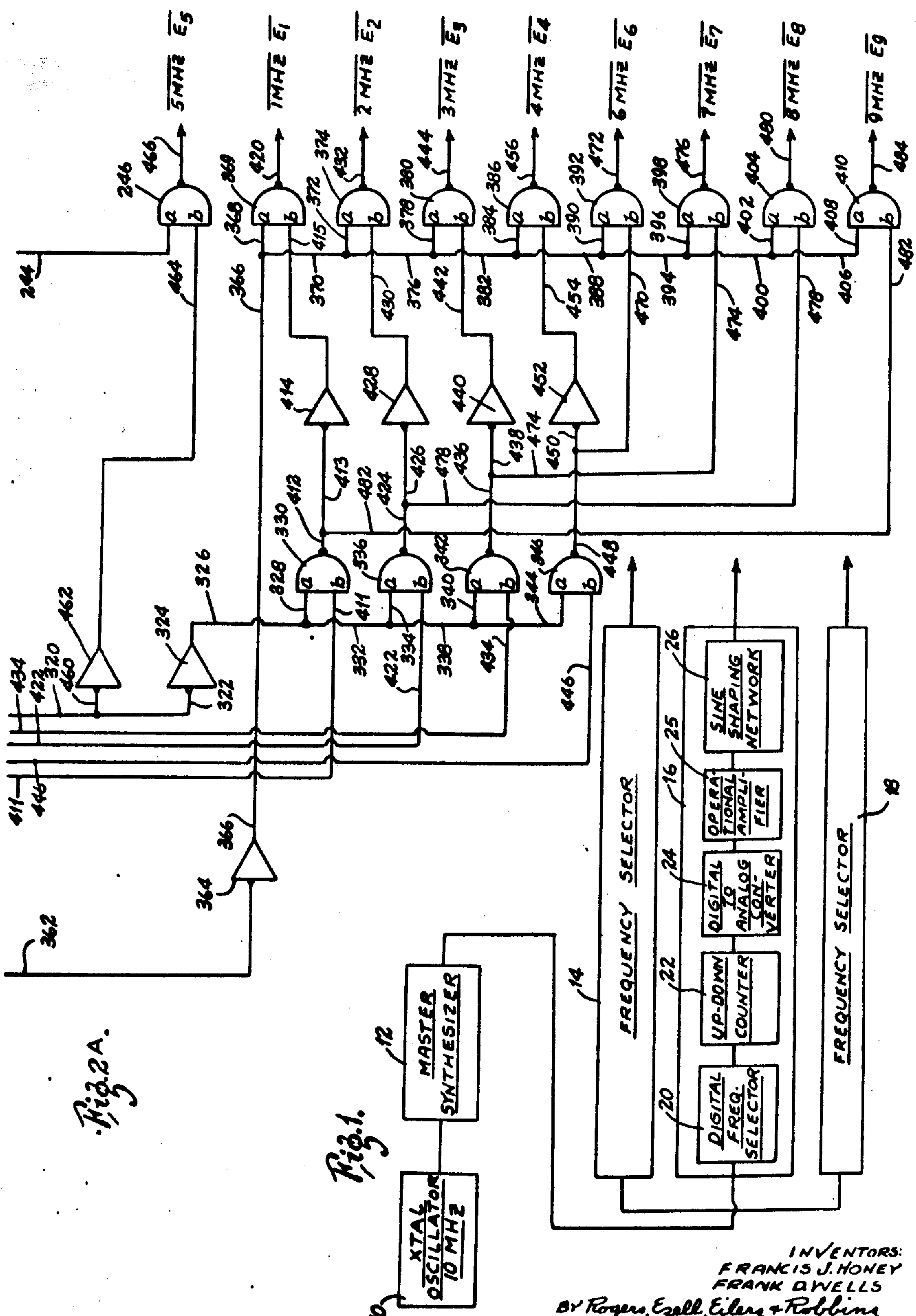


Fig. 2A.

Fig. 1.

INVENTORS:
FRANCIS J. HONEY
FRANK D. WELLS
BY Rogers, Ezell, Eilers & Robbins
ATTORNEYS

PATENTED SEP 5 1972 3,689,917

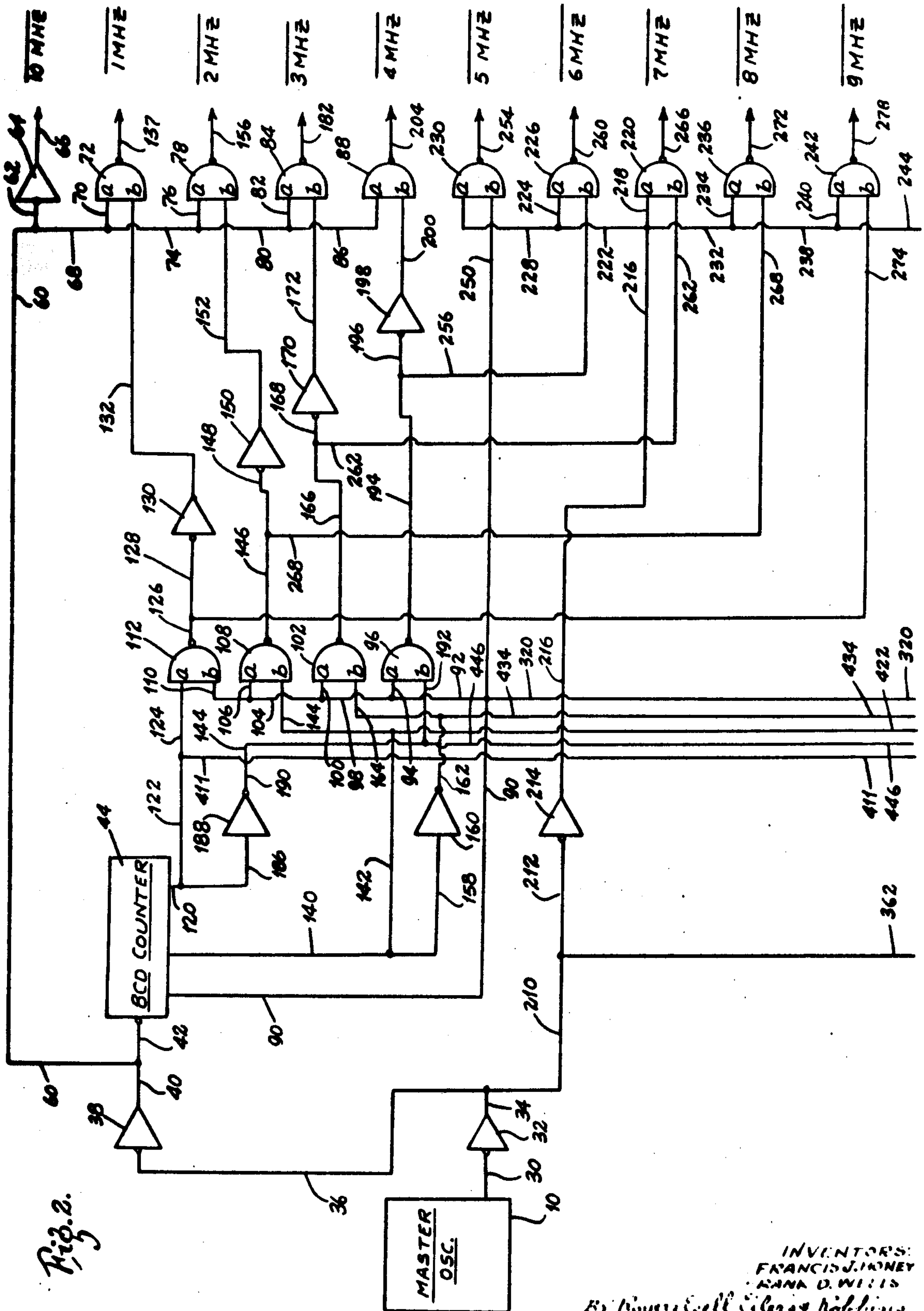


Fig. 2.

INVENTORS:
FRANCIS J. HONEY
FRANK D. WELLS
ATTORNEYS

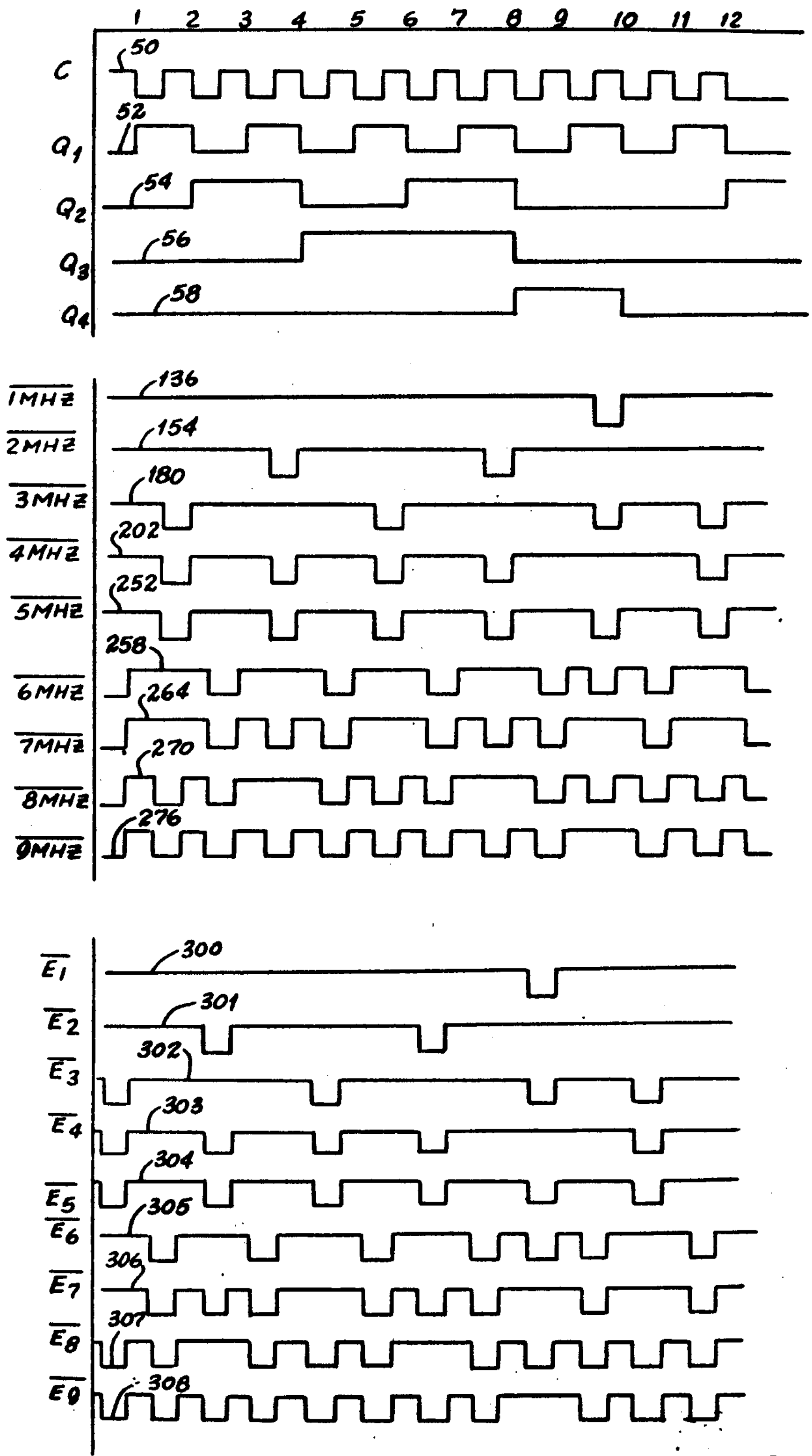


Fig.3.

INVENTORS:
FRANCIS J. HONEY
FRANK D. WELLS
BY Rogers, Ezell, Eilers & Robbins
ATTORNEYS

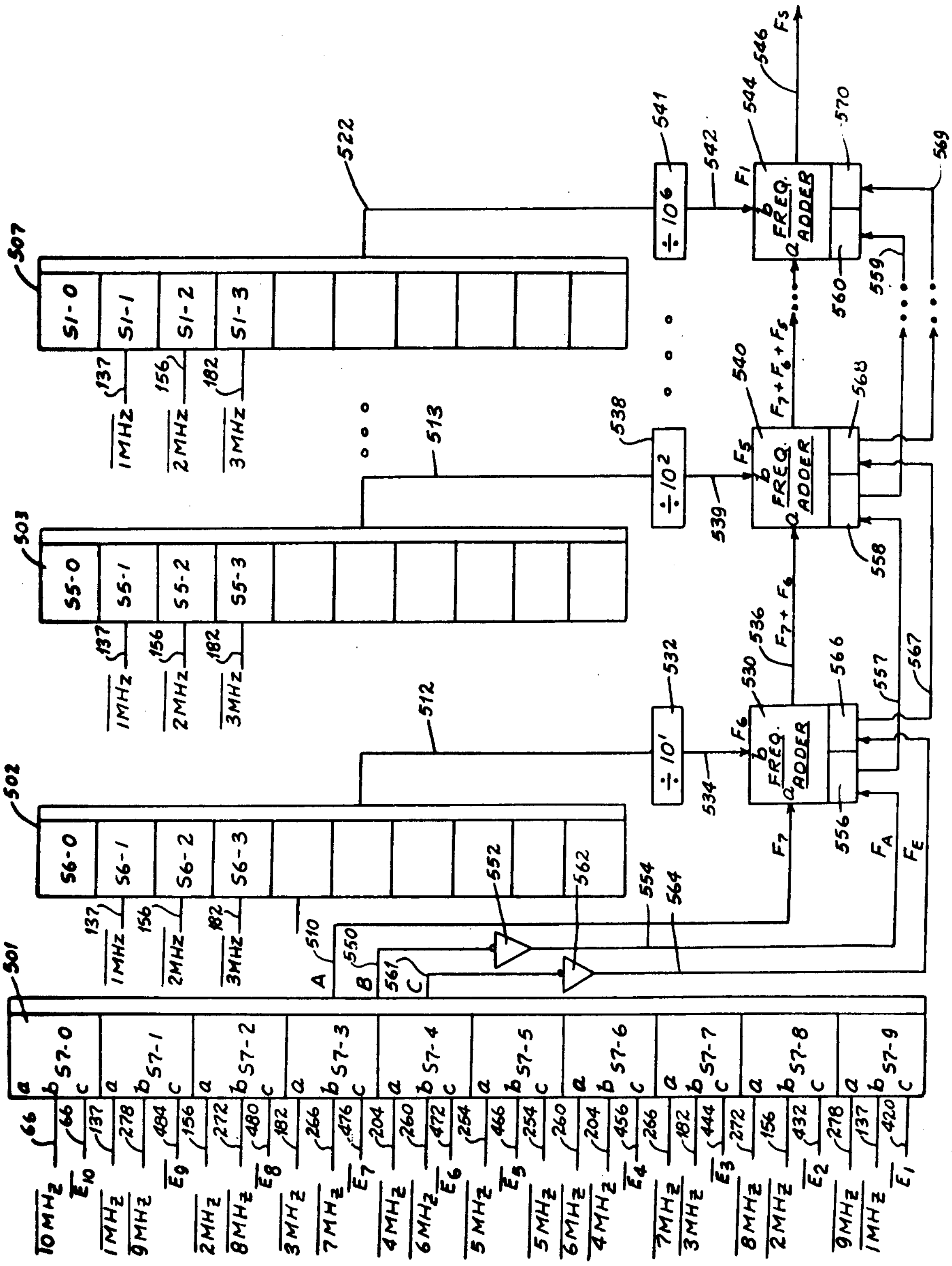


Fig. 4.

INVENTORS:
FRANCIS J. HONEY
FRANK D. WELLS
BY Rogers, Ezell, Eilers & Robbins
ATTORNEYS

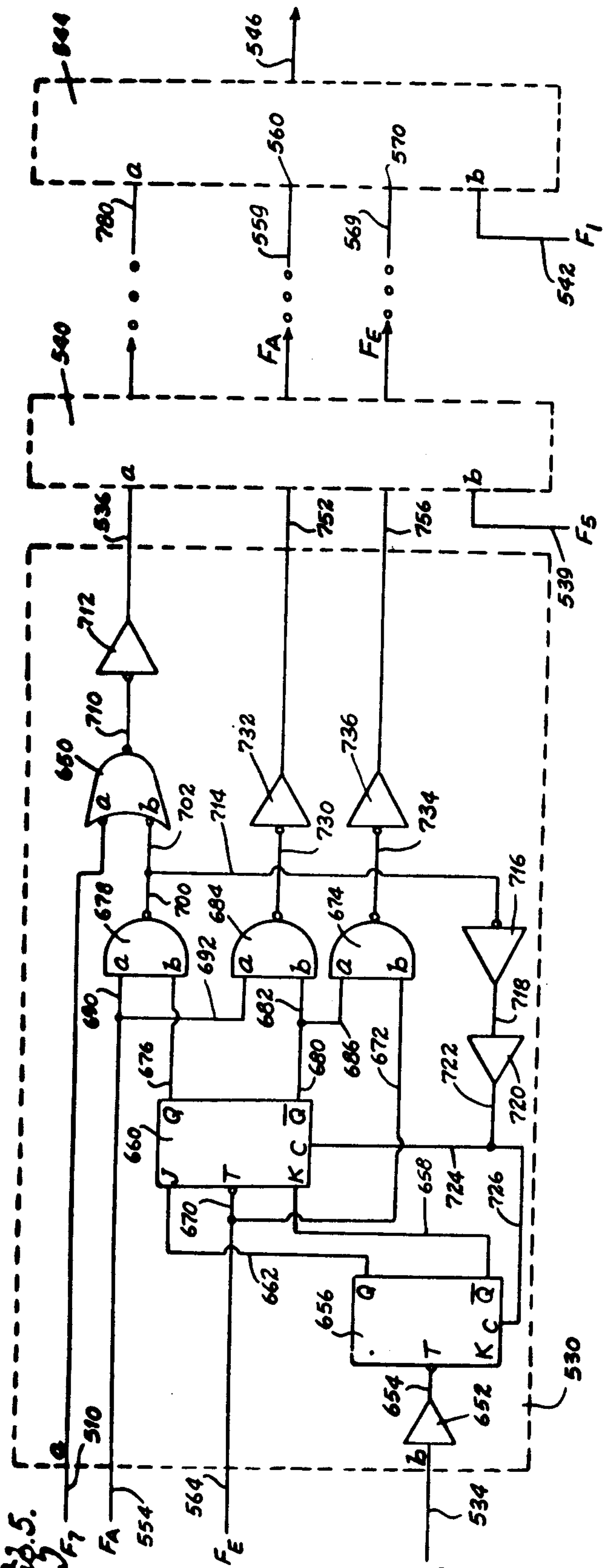


Fig. 5.

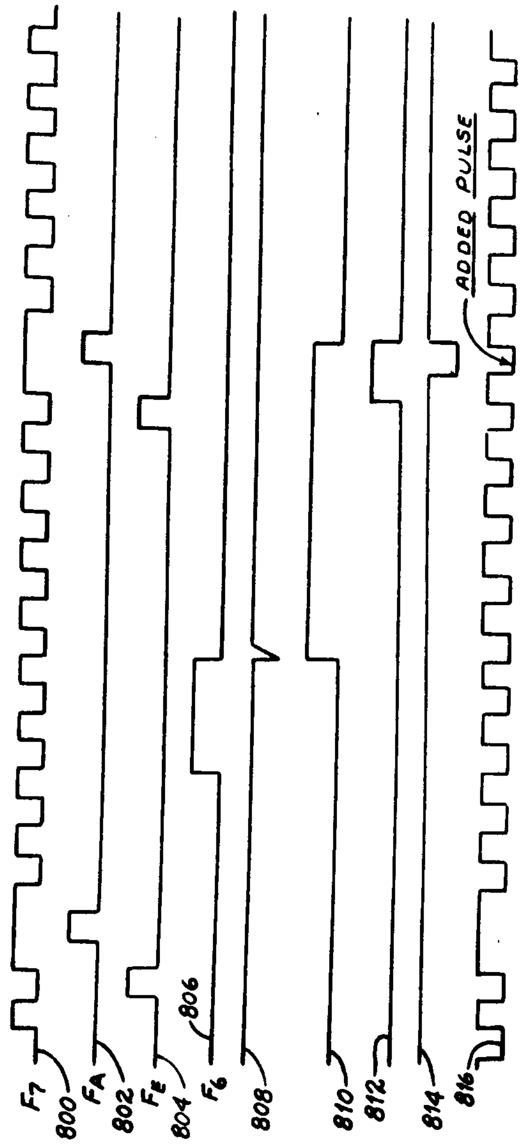
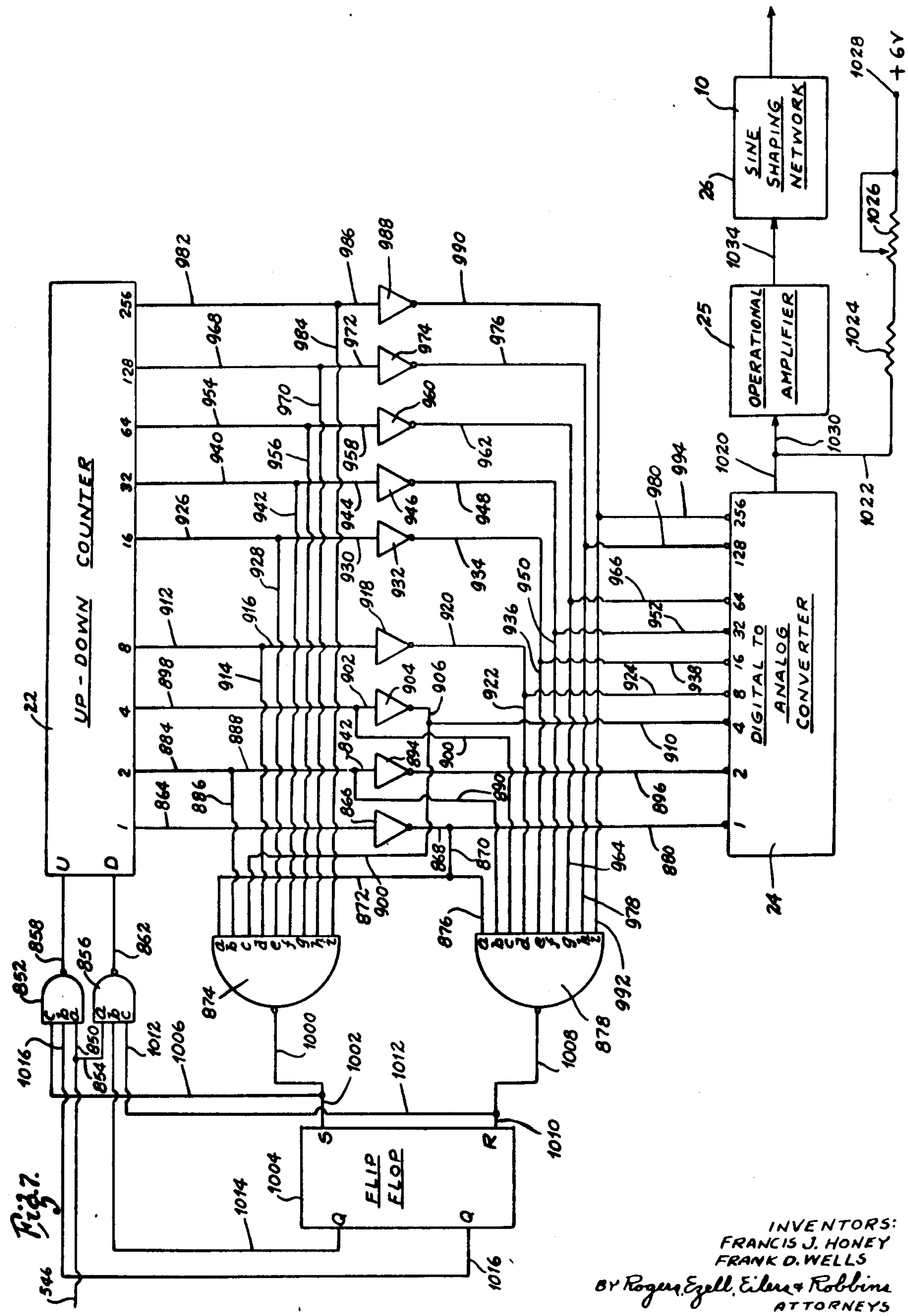


Fig. 6.

INVENTORS:
FRANCIS J. HONEY
FRANK D. WELLS
BY Rogers, Ezell, Eilers & Robbins
ATTORNEYS



INVENTORS:
FRANCIS J. HONEY
FRANK D. WELLS
BY Rogers, Ezell, Eilers & Robbins
ATTORNEYS

14

United States Patent

Harrison, III et al.

[15] **3,700,792**

[45] **Oct. 24, 1972**

[54] **COMPUTER ANIMATION GENERATING SYSTEM**

[72] Inventors: **Lee Harrison, III**, Englewood; **Francis J. Honey**; **Edwin J. Tajchman**, both of Denver, all of Colo.

[73] Assignee: **Computer Image Corporation**, Denver, Colo.

[22] Filed: **Dec. 4, 1969**

[21] Appl. No.: **882,125**

[52] U.S. Cl. ....**178/6.8**, 315/18, 315/26, 340/324 A

[51] **Int. Cl.** **H04n 3/30**

[58] **Field of Search** ......340/324 A; 178/6.8; 315/18, 315/26

[56] **References Cited**

UNITED STATES PATENTS

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3,501,669	3/1970	Henderson	315/18
3,364,382	1/1968	Harrison	178/6.8 X
3,527,978	9/1970	Harrison	315/18
3,441,789	4/1969	Harrison	315/18

Primary Examiner—Robert L. Griffin
Assistant Examiner—Richard K. Eckert, Jr.
Attorney—Kingsland, Rogers, Ezell, Eilers & Robbins

[57] **ABSTRACT**

A system for automatically animating scenes viewed by a video camera and displaying the animated scenes. Animation can be collectively of the entire scene or separately of individual sections of the scene viewed by the video camera. Real time animation is selected from any of several pre-programmed animation sequences synchronized with the video camera.

29 Claims, 4 Drawing Figures

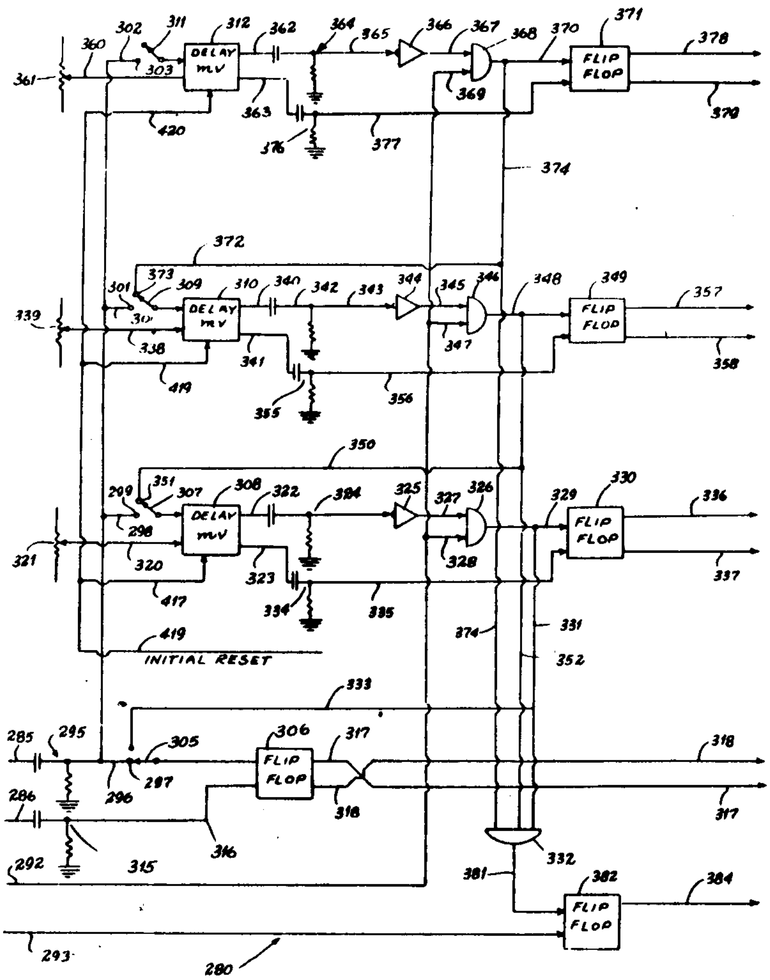
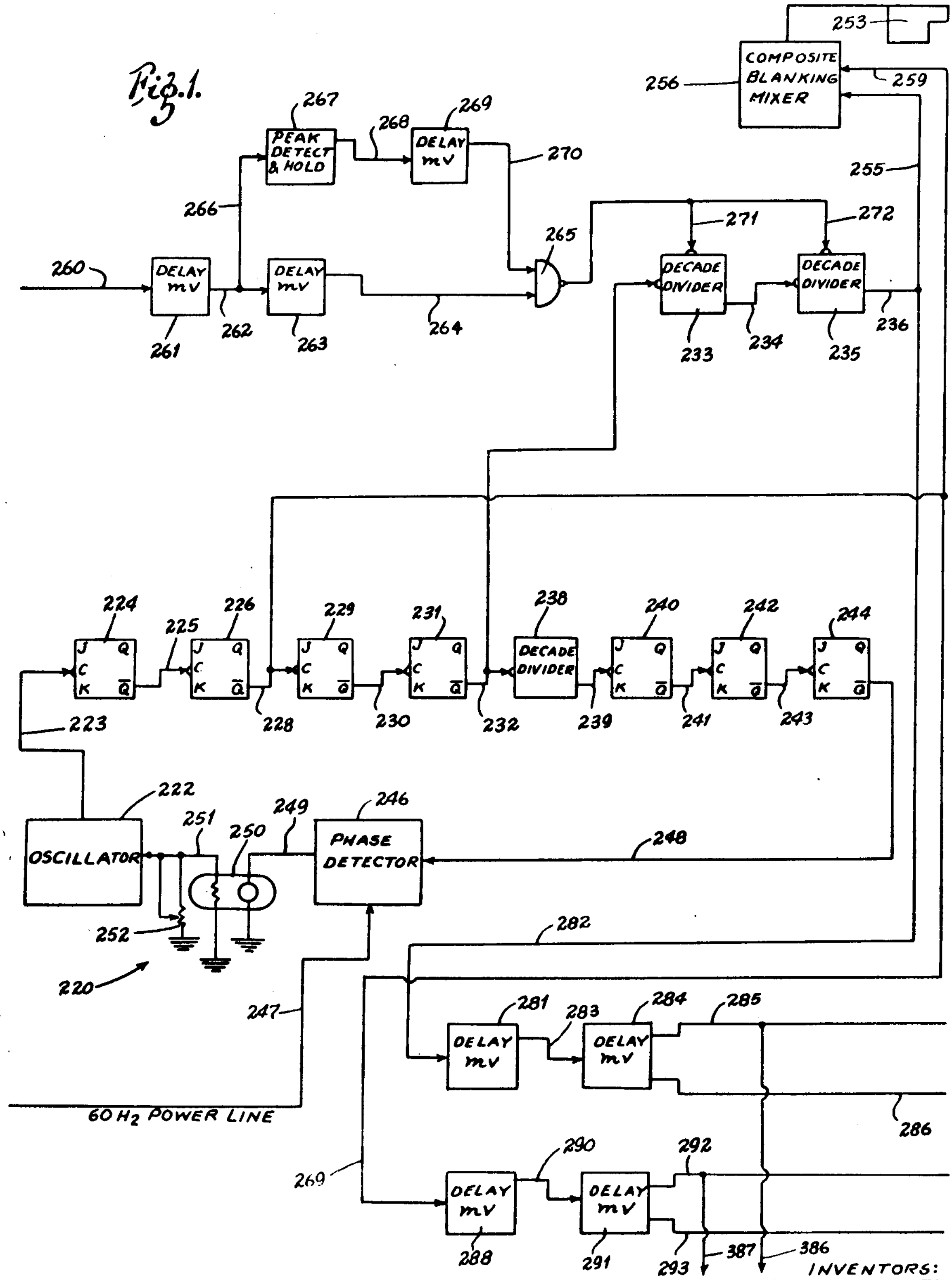
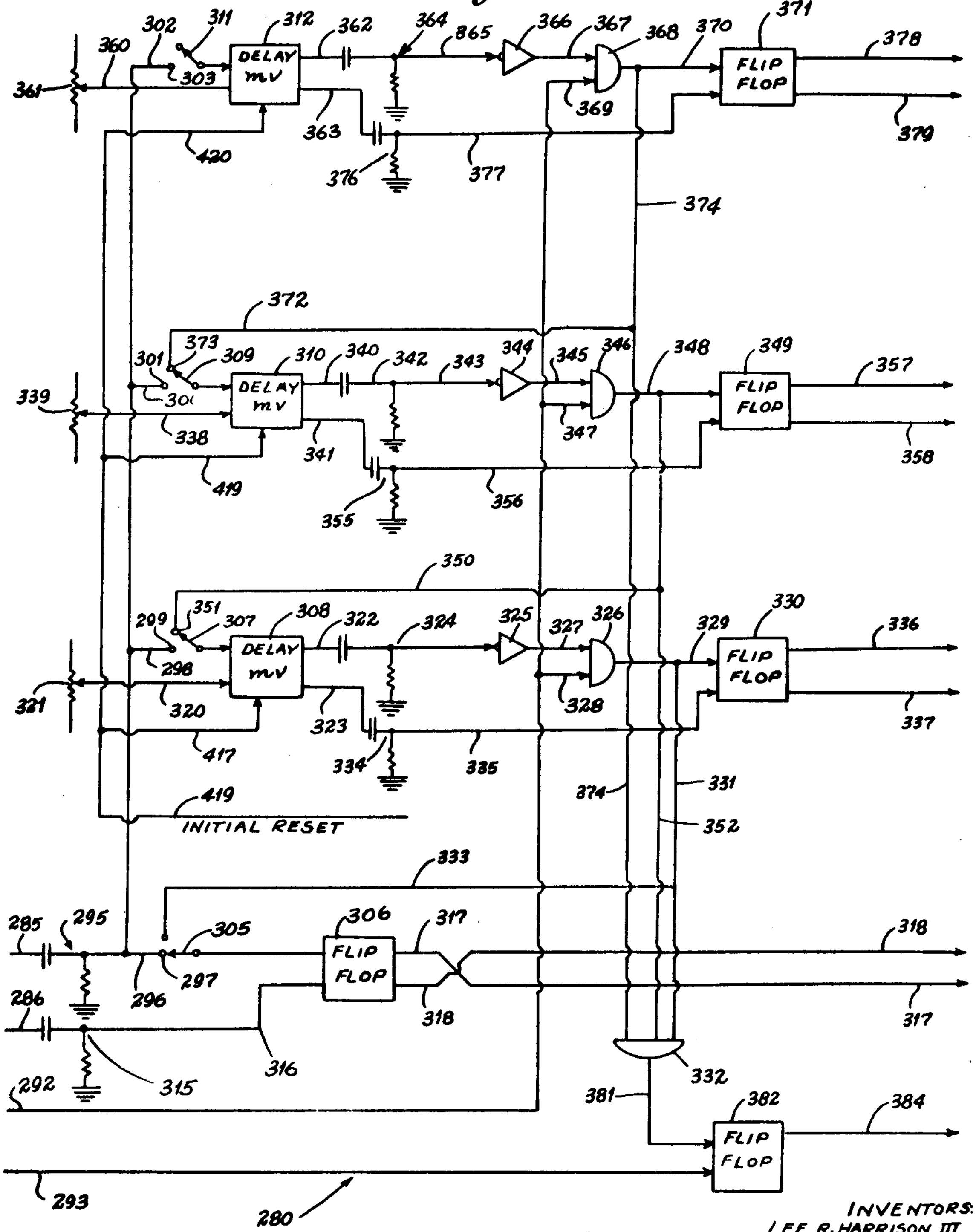


Fig. 1.



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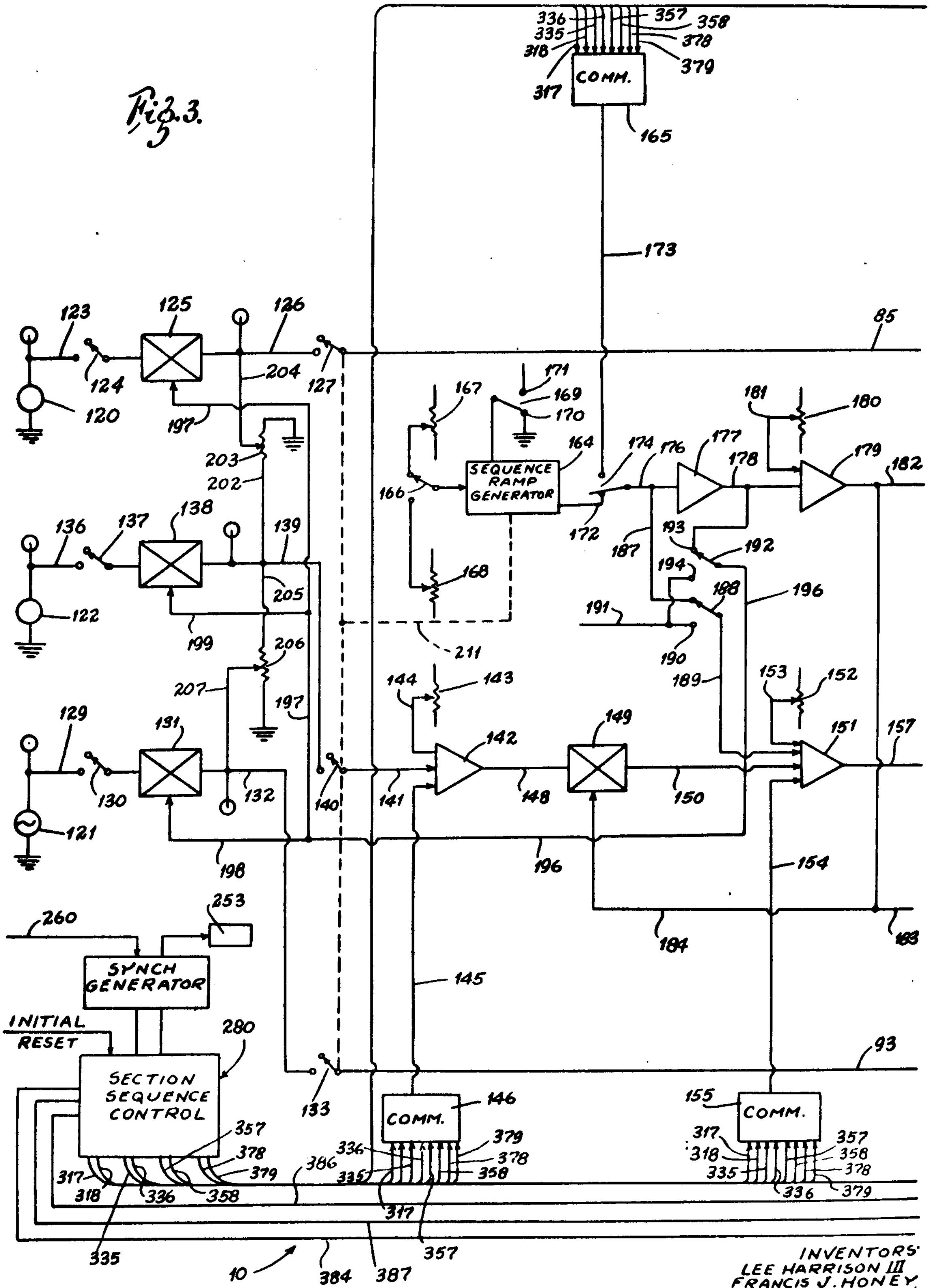
Fig. 2.



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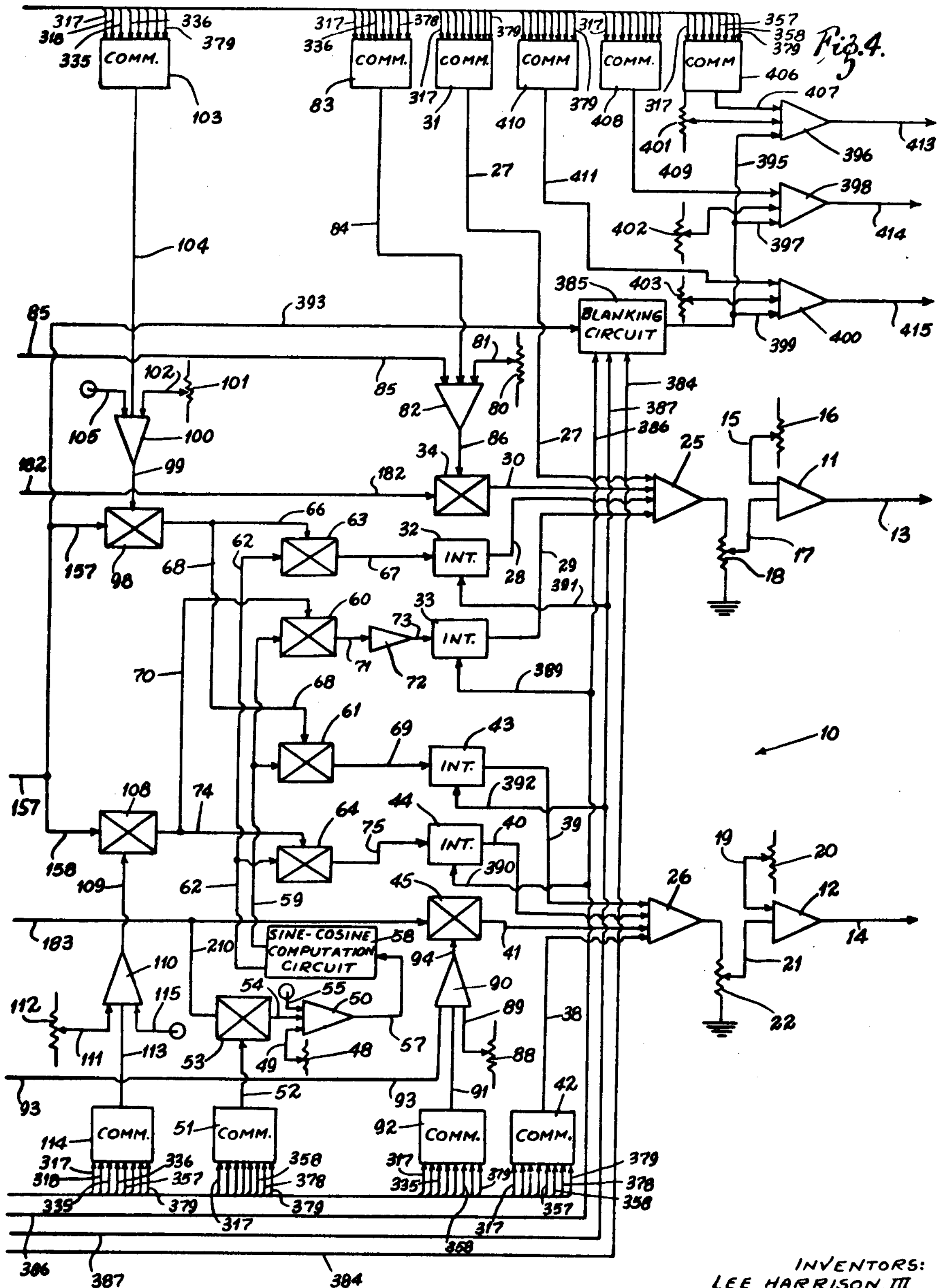
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Fig. 3.



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